ASM REVIEW OF METAL LITERATURE 1948

A. C. Forsyth

REVIEW OF METAL LITERATURE

An Annotated Survey of Articles and Technical Papers Appearing in the Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio.

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MARJORIE R. HYSLOP

Editor

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PREFACE

The A.S.M. Review of Current Metal Literature is a monthly feature of *Metals Review*, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in *Metals Review* from February 1948 through January 1949, and represents a complete survey of the metallurgical literature published during the period January through December 1948. It is the fifth volume in a series that began in 1944.

The annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety.

Attention is called to the table of contents immediately following and to the subject index starting on page 747. The table of contents lists the various subdivisions and classifications with explanatory notes on each; this classification is arranged primarily by processes. The subject index has been prepared with the emphasis primarily on materials, although processes are likewise indexed in detail in this section of the book. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal industry. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or welding, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of corrosion, or a particular type of welding, these broad processes will be found broken down and subdivided in the subject index. An

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author index is also provided and a list of addresses of the journals and periodicals.

The actual preparation of the annotations has been under the capable direction of Ralph H. Hopp, technical librarian, and W. W. Howell, technical abstractor at Battelle Memorial Institute. To these men belongs the credit for the thoroughness of the metallurgical coverage, and for the skilled selection of pertinent points to be included in these brief annotations. Likewise, their advice and suggestions as to scope, classification and other matters of organization have been invaluable.

Proofreading, checking for accuracy, and other details of preparing the material for printing have been handled with paintaking thoroughness and ability by Helen Lawton of the A.S.M. staff.

MARJORIE R. HYSLOP
Editor of METALS REVIEW *and of the A.S.M. Review of Metal Literature*

May 1, 1949

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*Subdivided into four sections: (a) General; (b) Ferrous; (c) Nonferrous; (d) Light Metals.

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1a—General

1a-1. Crushing and Grinding. Lincoln T. Work. *Industrial and Engineering Chemistry*, v. 40, Jan. 1948, p. 9-10.

Reviews literature published in 1947. 30 ref.

1a-2. Flotation. J. Bruce Clemmer. *Industrial and Engineering Chemistry*, v. 40, Jan. 1948, p. 28-32.

Reviews 1947 literature. 58 ref.

1a-3. Sedimentation and Hydraulic Classification. Anthony Anable. *Industrial and Engineering Chemistry*, v. 40, Jan. 1948, p. 50-52.

Reviews 1947 developments. 13 ref.

1a-4. Effects of Oxidation of Sulphide Minerals on Their Flotation Properties. Enid C. Plante and K. L. Sutherland. *Mining Technology*, v. 12, Jan. 1948, T. P. 2297, 29 pages.

Reports investigations of above with particular reference to adhesion of air bubbles to the mineral. 36 ref.

1a-5. Flotation of Unoxidized and Oxidized Sulphide Minerals—Antimonite, Arsenopyrite, Covellite, Lollingite, Marcasite, Orpiment, Pyrrhotite and Tetrahedrite. Enid C. Plante. *Mining Technology*, v. 12, Jan. 1948, T.P. 2298, 15 pages.

Uses captive bubble and cylinder flotation tests to study the response of above minerals to ethyl xanthate as a collector.

1a-6. Mineral Dressing. J. F. Myers. *Mining and Metallurgy*, v. 29, Feb. 1948, p. 80-86.

1947 developments.

1a-7. How American Industry Uses Magnetic Separators. *Flow*, v. 3, Feb. 1948, p. 36-41.

The four primary functions include removal of tramp metal, concentration, purification, and reclamation. A list of points is included as a guide to choice of the correct type for a given product and process.

1a-8. Research and Development Open New Phase in Milling. R. H. Ramsey. *Engineering and Mining Journal*, v. 149, Feb. 1948, p. 104-109.

1947 developments.

1a-9. Physical Chemistry of Flotation. XI. Kinetics of the Flotation Process. K. L. Sutherland. *Journal of Physical & Colloid Chemistry*, v. 52, Feb. 1948, p. 394-425.

An investigation of the direct-encounter hypothesis for adhesion of mineral to bubble. Several theoretical conclusions were reached. However, the equation derived for variation of flotation rate with mineral size, under continuously operating conditions, fails to predict the uniform flotation rate which has been found by some authors at small sizes. The possibility of flocculation of particles is discussed. 28 ref.

1a-10. Past Progress and Future Aims in Mineral Dressing. George H. Roseveare. *Mining Congress Journal*, v. 34, Feb. 1948, p. 54-57.

1a-11. Radioactive Tracers; How They Can Be Used in Flotation Research. *Engineering and Mining Journal*, v. 149, March 1948, p. 53-55.

Details of some techniques being applied at M.I.T. by A. M. Gaudin and co-workers. Carbon 14 is used to trace the movements of flotation reagents, or their ions, among the several phases or products of a flotation operation.

1a-12. Heavy-Density Separation — A Review of Its Literature. John W. Hyer, Jr. *Quarterly of the Colorado School of Mines*, v. 43, Jan. 1948, p. 1-94.

94 references.

1a-13. Heavy-Media Separation Processes—Present Status and Potentialities. G. B. Walker. *Mining Congress Journal*, v. 34, March 1948, p. 38-41, 44-47.

A thorough analysis of processes developed by American Cyanamid. Descriptions of several existing heavy-media plants.

1a-14. Attachment of Mineral Particles to Air Bubbles in Flotation. H. Rush Spedden and William S. Hannan, Jr. *Mining Technology,* v. 12, March 1948, T.P. 2354, 6 pages.

One part of the flotation process which has not been adequately explained is the mechanism by which selected mineral particles become attached to air bubbles. Present theories and results of a study by means of high-speed, motion picture photography of the formation of the air-mineral interface.

1a-15. Review of Results Obtained From Semiportable HMS Plants. Robert W. Hernlund. *Mining World,* v. 10, April 1948, p. 23-27.

Details of results obtained from 10 installations of heavy-media-separation units ranging from minerals of high specific gravity, such as galena, to anthracite coal. Cost data.

1a-16. Mexico's Ore-Testing Laboratory. T. L. Johnston. *Engineering and Mining Journal,* v. 149, April 1948, p. 95.

1a-17. Toward Decreased Ball Wear. *Engineering and Mining Journal,* v. 149, May 1948, p. 90-91.

It was found that wear first increases and then decreases as grinding time increases and the product gets finer. It is believed that more rapid elimination of finer sizes will result in reduction of ball wear.

1a-18. Ability of Solid Substances to Respond to Flotation; Flotation Relationships. (In Russian.) Z. V. Volkova. *Zhurnal Fizicheskoi Khimii,* (Journal of Physical Chemistry), v. 22, Jan. 1948, p. 121-128.

A formula for determination of the probability of the mineralization of air bubbles. This probability is a function of the average volume of the bubbles. It reaches a maximum for a certain bubble volume, and then decreases to zero for maximum bubble volume. The higher the value of the function, and the wider the range of volumes between the maximum volume and maximum function, the higher the ability to be floated.

1a-19. Kornstorlekens inverkan pa kulkvarnskulornas slitage. (Influence of Grain Size on the Wear of Ball-Mill Balls.) Sture Mörtsell. *Jernkontorets Annaler,* v. 132, 1948, p. 112-114.

1a-20. New Dry Concentrating Equipment. W. J. Long. *Bureau of Mines, Report of Investigations* No. 4286, May 1948, 10 pages.

Vibrating-deck mineral separator; electrostatic-mineral shape separator; and progressing-field magnetic separator developed to separate minerals of different shape, magnetic susceptibility, or electrostatic conductivity.

1a-21. Seventy-Five Years of Progress in Ore Dressing. Arthur F. Taggart. *Seventy-Five Years of Progress in the Mineral Industry, 1871-1946* (American Institute of Mining and Metallurgical Engineers), 1947, p. 82-125.

44 references.

1a-22. Techniques of Mineral Exploitation of the Future, Louis S. Cates and Howland Bancroft. *Seventy-Five Years of Progress in the Mineral Industry, 1871-1946* (American Institute of Mining and Metallurgical Engineers), 1947, p. 759-790.

Exploration, mining, and beneficiation. 18 ref.

1a-23. Operating Results With the W. K. E. (HMS) Mobil-Mill. Robert W. Hernlund. *Mines Magazine,* v. 38, July 1948, p. 17-20, 45.

Previously abstracted from *Mining World,* v. 10, April 1948, p. 23-27 See item 1a-15. 1948.

1a-24. Industrial Minerals Research Richard J. Anderson. *Mines Magazine* v. 38, July 1948, p. 26-28, 34.

Progress in beneficiation techniques and new raw-material developments.

1a-25. Froth Flotation. L. A. Roe. *Chemical Engineering,* v. 55, July 1948, p. 96-98.

Present and potential application not only in ore beneficiation but also in miscellaneous chemical-industry separations—sizing; recovery of fossil resin from coal; cleaning peas and wheat; water purification; separation of a fungus from rye; and recovery of miscellaneous industrial wastes. 14 ref.

1a-26. The Electrostatic Separation of Several Industrial Minerals. Foster Fraas and Oliver C. Ralston. *Mining Technology,* v. 12, July 1948, T.P. 2408, 11 pages.

Electrostatic separation of sillimanite, kyanite, andradite, diopside, and zircon from commercial samples in order to illustrate what may be accomplished with other combinations of minerals. The information presented includes particle-surface conditioning and the adaptation of each separation to a particular type of separator. Such electrical phenomena may have future applications including compacting of abrasive powders and agglomeration and dispersion of other powders.

1a-27. The Application of Small Amplitude High Frequency Vibratory Motion to Certain Types of Ore Dressing Equipment. P. T. Bruhl, E. R. Rudolph, and L. Taverner. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 48, May 1948, p. 343-360; discussion, p. 360-363.

Applied to machinery such as concentrating tables, strakes, jigs, and classifiers.

1a-28. Radioactive Tracers in Flotation. A. M. Gaudin, P. L. de Bruyn, F. W. Bloecher, and C. S. Chang. *Mining and Metallurgy,* v. 29, Aug. 1948, p. 432-435.

Presents a study of the use of carbon 14 as a tracer and the reasons why it is suited to the study of flotation reactions. Theory and operation of counter tubes and typical problems in which tracer technique will be useful. 11 ref.

1a-29. Laboratory Concentration of Complex Sulfide-Oxide Ore From Shenandoah-Dives Mine, Silverton, Colo. Heine Kenworthy. *Mines Magazine,* v. 38, Aug. 1948, p. 19-24, 40.

A résume of ore-dressing treatment, with tables of resultant data.

1a-30. Automatic Control of Pulverizers. Phelan McShane. *Engineering and Mining Journal,* v. 149, Sept. 1948, p. 86-87.

By automatically adjusting feed rate to suit particle size and hardness, device increases tons crushed or ground by ordinary ball-mill or crusher equipment.

1a-31. A Simple Flotation Cell. E. J. Pryor and Koung-Bi Liou. *Bulletin of the Institution of Mining and Metallurgy,* Sept. 1948, p. 11-18.

Homemade cell made of conventional glass vessels for use in laboratory tests.

1a-32. Spiral Concentration. Judson S. Hubbard. *Mining World,* v. 10, Sept. 1948, p. 40-42, 44.

Operating data for the Humphreys spiral concentrator on a variety of materials with a wide difference of specific gravity, ranging from anthracite and phosphates to lead-zinc ores.

1a-33. Investigation of the Chemistry of Flotation Processes. (In Russian.) V. A. Glembotskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), March 1948, p. 385-390.

A new method of depression of minerals during flotation based on the inhibition of the collecting surface reaction, which is attained by reducing the cation or anion concentration of mineral in the gangue. This depression was established in the case of barite, celestite, anglesite, galenite, fluorite, and other minerals.

1a-34. Rapid Electrometric Method for Determination of Aluminum in Ores. (In Russian.) S. K. Chirkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 783-787.

A new method claimed to give as accurate results as gravimetric analysis and to be much more rapid and simple.

1a-35. Recent Developments in Heavy-Density Separation. John V. Beall. *Mining and Metallurgy,* v. 29, Sept. 1948, p. 488-492.

1a-36. New Dry Concentrating Equipment. W. J. Long. *Mines Magazine,* v. 38, Oct. 1948, p. 16-20, 32.

Previously abstracted from *Bureau of Mines, Report of Investigations* No. 4286, May 1948. See item 1a-20, 1948.

1a-37. Infrared Light for Mineral Determination. Rene Bailly. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 519-531.

By adapting photo-electric cells, sensitive to infrared, to different optical instruments used in mineralogy, it is possible to obtain the refractive indices, birefringence, and absorption indices. 32 ref.

1a-38. The Dark-Field Color Immersion Method. Nelson B. Dodge. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 541-549.

With dark-field illumination, color criteria provide an alternative to the usual methods for comparing index of crushed grains with immersion media. Since organic immersion liquids have steeper dispersion curves than inorganic solids, spectrum colors are produced from white light by refraction at interfaces of grains and liquid.

1a-39. Beneficiation of Mineral Ores. *Journal of Scientific & Industrial Research,* v. 7, Sept. 1948, p. 394-397. Reprinted from *Transactions Mining, Geological & Metallurgical Institute of India,* v. 41, 1946, p. 33-175.

A series of investigations on the beneficiation of phosphatic, antimony, flake graphite, sulphur, and chromite ores were recently carried out by the Utilization Branch of the Geological Survey of India.

1a-40. The Cyclone; Its Use for Mineral Concentration. F. T. C. Doughty. *Mine & Quarry Engineering,* v. 14, Nov. 1948, p. 337-340.

Principles, constructional details, and results of preliminary tests on various types of ores. Includes typical flowsheet. The cyclone is useful primarily for particle sizes below 1 mm., where heavy-media separation is not feasible.

1a-41. The Role of Research in the Development of Labor-Saving Equipment and Methods. E. R. Borcherdt. *Mining Congress Journal,* v. 34, Nov. 1948, p. 32-35.

Explains the scope of mining research and some of the results obtained in the field of rock drilling, including bits, drill steel, rock drills, drill rounds, and high-speed drifting. (To be concluded.)

1a-42. The G.E.C. Mineral Dressing Laboratory. A. E. Andrews. *Mining Magazine,* v. 79, Nov. 1948, p. 275-280.

Facilities and procedures of above laboratory (General Electric Co., Ltd., Wembley, England).

1a-43. Advances in Milling Practice. W. L. Zeigler. *Mining World,* v. 10, Dec. 1948, p. 32-34.

Reviews evolutionary trends.

1a-44. Australian Research on the Theory of Flotation. Ian W. Wark. *Australian and New Zealand Association for the Advancement of Science* (Adelaide), *Extract from Report of the 25th Meeting of the Association,* 1946, 29 pages.

Basic principles of the process and advances made in the use of addition agents to the water used, such as chemicals which make the process selective with respect to each of the minerals of the ore in turn.

1b—Ferrous

1b-1. Iron Ore Beneficiation at Josephine Mine. Chas. A. Hames. *Canadian Institute of Mining and Metallurgy, Transactions,* v. 50 (Bound with *Canadian Mining and Metallurgical Bulletin*), Dec. 1947, p. 637-656.

The deposit is a siliceous hematite, with silica present as fragments of cherty quartz. Preliminary test work, equipment, and flow sheets. Details of crushing, screening, conveying, jigging, dewatering, stockpiling, reclaiming, sampling, assaying, treatment costs, personnel, and marketing of concentrates and lump ore. The Hames lump-ore, heavy-media separator and its operation.

1b-2. Mount Andrew Iron Deposit, Kasaan Peninsula, Prince of Wales Island, Southeastern Alaska. W. S. Wright and A. W. Tolonen. *Bureau of Mines, Report of Investigations* 4129, Nov. 1947, 27 pages.

Location, deposits, ores, and sampling results. Two samples contain about 0.7% Cu and 50% Fe, and 58.3% Fe and only 0.05% Cu. Beneficiation and suggested flow sheets. A copper concentrate can be recovered from the first ore.

1b-3. Investigation of the Iron-Bearing Formation of the Western Gogebic Range, Iron County, Wis. Paul Zinner and Clyde L. Holmberg. *Bureau of Mines, Report of Investigation* 4155, Dec. 1947, 48 pages.

Results of magnetic concentration of magnetic fraction; magnetic concentration following a reducing roast in a hydrogen atmosphere; screen analyses; flotation of crude-ore samples; gravity concentration and gravity concentration followed by flotation; and combined magnetic flocculation, elutriation, and flotation. Also includes a description of the deposits and the ore, and results of sampling and analysis.

1b-4. Mesabi Taconite. Papers Presented at the 1945 Mining Symposium. *Mines Experiment Station, University of Minnesota, Information Circular* No. 5, Sept. 1945, 40 pages.

Consists of the following papers: Geological Description of the Mesabi Range Taconites, by Stephen Royce; Leasing and Administration of State Mineral Lands, by Ray D. Nolan; Taconite Mining—Past and Future, by R. W. Whitney; Present-Day Grinding Practice, by O. H. Johnson; Beneficiation of Eastern Mesabi Magnetic Taconite, by E. W. Davis; Methods of Agglomeration and the Problem of Agglomerating Fine Taconite Concentrates, by M. F. Morgan.

1b-5. Iron Ore Beneficiation Shows Healthy Growth. Francis X. Tartaron. *Engineering and Mining Journal,* v. 149, Feb. 1948, p. 110-113.

1947 developments.

1b-6. Georgia Iron Deposits, Cherokee, Bartow, Floyd, and Polk Counties. Part I. Walter T. Lewiecki. *Bureau of Mines, Report of Investigations No.* 4178, Jan. 1948, 28 pages.

Test results on ore samples.

1b-7. Reduction of Phosphorus Content in Iron Ore and Concentrate From Iron Mountain, Mo. H. Kenworthy. *Bureau of Mines, Report of Investigations* No. 4199, Feb. 1948, 20 pages.

Results of work done for the purpose of reducing the phosphorus content of the concentrate produced by Ozark Ore Co., which is sometimes as high as 0.40%, to less than 0.18%. Satisfactory results were obtained by a combination of several conventional ore-dressing processes.

1b-8. Enrichissement des Minerais de Fer Oolithiques Pauvres du Bassin Lorraine-Luxembourgeois. (Enrichment of Low-Grade Oolithic Iron Ores from the Lorraine-Luxembourg Basin.) N. Stoll. *Revue de Métallurgie,* v. 44, July-Aug. 1947, p. 221-227.

Results of laboratory work on beneficiation. Magnetic separation was satisfactory for all types except ferriferous cement. The roasted reduced ore must be ground very fine for best results.

1b-9. Completes New Laboratory for Study of Taconite Concentration. *Steel,* v. 122, May 10, 1948, p. 108, 110, 112.

New laboratory of Oliver Iron Mining Co., Duluth, Minn.

1b-10. U. S. Steel Pushes Ore Research. *Iron and Steel Engineer,* v. 25, May 1948, p. 92-93.

Laboratory and facilities of Oliver Ore Mining Co.

1b-11. Concentratability of Birmingham, Ala., Red Iron Ores by Separation in Heavy Media. B. H. Clemmons, R. H. Stacy, and B. G. Saunders. *Bureau of Mines, Report of Investigations* No. 4249, May 1948, 45 pages.

On the basis of the data presented, it is apparent that red iron ore from a number of the mines in the Birmingham area can be significantly improved in grade by heavy-medium treatment. Cost analysis. 14 ref.

1b-12. Shasta and California Iron-Ore Deposits; Shasta County, Calif. John R. Shattuck and Spangler Ricker. *Bureau of Mines, Report of Investigations* No. 4272, May 1948, 11 pages.

Description of deposits; results of preliminary sink-float, jig, table, and magnetic concentrator tests.

1b-13. The Ore-Preparation Plant at the Workington Branch of the United Steel Companies, Ltd. *Journal of the Iron and Steel Institute,* v. 159, May 1948, p. 73-76.

1b-14. The Preparation of Iron Ore for Blast Furnace and Open Hearth Use. Robert R. Williams. *American Iron and Steel Institute, Preprint,* 1948, 19 pages.

Crushing and screening, sintering plant operation, blending and reclaiming, sampling and weighing, hand picking, and effect of prepared ores on blast furnace practice. Analyses and properties.

1b-15. Cranberry Magnetite Deposits, Avery County, N. C., and Carter County, Tenn. M. H. Kline and T. J. Ballard. *Bureau of Mines, Report of Investigations* No. 4274, May 1948, 85 pages.

Investigative work and results of mineral-dressing tests. Concentration and pilot-mill tests and suggested flow sheet for ore.

1b-16. J & L Pushes Development of New York Iron Ore Mines. *Steel,* v. 123, Aug. 2, 1948, p. 66-67.

Mining and beneficiation methods.

1b-17. Magnetic Concentration Experiments Upon Iron Ores Used in North Lincolnshire Practice. L. Reeve. *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 275-280.

The design and installation of a small magnetic roasting kiln to determine to what extent the laboratory results could be duplicated on a somewhat larger scale. Full details of this kiln, together with those of a continuous magnetic separator of the Ball-Norton belt type. Preliminary results indicate that the kiln fully confirms the laboratory results through a wide range of ore feed and gas flow. Some consideration is also given to the use of suitable factors to express degree of concentration achieved, examples of which are given. The importance of the petrographic structure of iron ores in relation to their concentration is also indicated.

1b-18. Laboratory-Developed Concentration Processes Bolster Iron Ore Reserves. *Civil Engineering,* v. 18, Oct. 1948, p. 46.

Work of new laboratory which will engage in a long-range study to develop commercially useful concentrating methods for taconite, wash, and intermediate ores.

1b-19. New Semi-Portable Ore Treatment Plant at Pennington Mine on Cuyuna Range. *Skillings' Mining Review,* v. 37, Oct. 9, 1948, p. 1, 4.

Includes flow diagram.

1b-20. Iron Production Increased 38.2% by Improved Size Preparation and Bulk Blending of Ores. Robert R. Williams, Jr. *Steel,* v. 123, Nov. 8, 1948, p. 112, 115-116, 118, 136, 138, 140.

Previously abstracted from *American Iron and Steel Institute, Preprint,* 1948. See item 1b-14, 1948.

1b-21. Iron Ore Reserves in Michigan. Franklin G. Pardee. *Mining and Metallurgy,* v. 29, Nov. 1948, p. 613-614.

Including prospects for beneficiation.

1b-22. Reduction of Iron Ores and Agglomerates. (In Russian.) L. M. Tsylev. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 673-680.

Attempts to solve the problem of the different reducibilities of several types of iron ore (magnetite,

hematite, limonite) by partially reducing them in a hydrogen atmosphere at different temperatures and by investigating the resulting agglomerates. On the basis of microscopic investigation, five different schemes for the reduction process are proposed.

1b-23. New Ore Washing Plant at Mountain Iron Mine, Mesabi Range. *Skillings Mining Review,* v. 37, Dec. 4, 1948, p. 1, 4, 9.

Includes flow sheet.

1b-24. Ore-Dressing Laboratory at the United Steel Companies, Ltd. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 310-314.

1b-25. Magnetic Concentration; Experiments Upon Iron Ores Used in North Lincolnshire Practice. L. Reeve. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 509-511; discussion, p. 585-586.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 275-280. See item 1b-17, 1948.

1c—Nonferrous

1c-1. Northwest Magnesite's HMS Plant. *Mining World,* v. 9, Dec. 1947, p. 18-22.

Heavy-media separation plant and procedures.

1c-2. Can Mexico's Tin Industry Be Modernized? R. M. Atwater, Jr. *Engineering and Mining Journal,* v. 149, Jan. 1948, p. 74-77.

Problems involved in introduction of modern mining and concentration methods.

1c-3. Investigation of the Mount Eielson Zinc-Lead Deposits, Mount McKinley National Park, Alaska. Neal M. Muir, Bruce I. Thomas, and Robert S. Sanford. *Bureau of Mines, Report of Investigations* 4121, Nov. 1947, 14 pages.

Description of ore deposits and results of sampling and analysis. Results of flotation tests were unsatisfactory.

1c-4. Concentration of Carbonate and Oxide Manganese Ores From the Vicinity of Tracy, Central Calif. B. K. Shibler, W. W. Agey, and K. C. Vincent. *Bureau of Mines, Report of Investigations* 4137, Nov. 1947, 16 pages.

Brief separate reports on three widely differing ores. Five of the eight samples were amenable to the production of high-grade manganese concentrates by ore-dressing.

1c-5. Beneficiation of Oxide and Carbonate Manganese Ores From the Philipsburg District, Granite County, Mont. R. R. Wells, A. O. Ipsen, and K. C. Vincent. *Bureau of Mines, Report of Investigations* 4138, Nov. 1947, 14 pages.

All of the ores were amenable to the production of high-grade metallurgical manganese products marketable with small silica-plus-alumina penalties. Psilomelane and pyrolusite are the chief manganese minerals. The chief gangue mineral is silica, which occurs as quartz and quartzite. Zinc and silver are present in appreciable quantities, either chemically combined with the manganese oxides or finely disseminated throughout the ore.

1c-6. Concentration of Oxide Manganese Ores From the Vicinity of Long Valley, Coconino County, Ariz. C. H. Schack, H. G. Poole, and A. O. Ipsen. *Bureau of Mines, Report of Investigations* 4140, Nov. 1947, 13 pages.

Several types of ores, differing in grade and mineral associations, were studied. In all instances, the manganese minerals are psilomelane and pyrolusite, with minor amounts of other manganese oxides. The general possibilities of ore dressing in beneficiating the ores from this district, both from the individual operator's point of view, and for the district as a whole.

1c-7. Concentration of Manganese Ore From Southeastern Juab County, Utah. B. K. Shibler and R. Havens. *Bureau of Mines, Report of Investigations* 4141, Nov. 1947, 11 pages.

Results of ore-dressing tests on three samples from two properties. None of the samples were amenable to ore dressing for the production of high-grade manganese sinter.

1c-8. Concentration of Manganese Ores From Grand and Emery Counties, Utah. G. M. Potter, W. G. Sandell, B. K. Shibler, and H. D. Snedden. *Bureau of Mines, Report of Investigations* 4142, Dec. 1947, 40 pages.

Most of the ores were not amenable to the production of high-grade manganese concentrates with high recoveries. Plus-48% manganese products were made with over 70% recoveries from only three of the 11 samples tested.

1c-9. Concentration of Oxide Manganese Ores From the Havasu Lake District, Calif. and Ariz. R. Havens, G. M. Potter, W. W. Agey, and R. R. Wells. *Bureau of Mines, Report of Investigations* 4147, Dec. 1947, 18 pages.

Work on five different ores, which varied widely in their constitution. Only one of the samples was amenable to concentration for production of high-grade manganese products. A combined sand-tabling and slime-flotation treatment was used.

1c-10. Concentration of Oxide Manganese Ores From the Artillery Peak Deposit, Mohave County, Ariz. R. Havens, G. M. Potter, and S. J. Hussey. *Bureau of Mines, Report of Investigations* 4148, Nov. 1947, 16 pages

These ores present a difficult problem in concentration because they are low-grade and the association of manganese and gangue minerals is intimate and complex. The known size of this deposit has justified investigation of processes such as leaching for preliminary enrichment of the original feed. The ores from the Maggie Canyon area were amenable to concentration, and manganese recoveries of 73 to 78% were made in flotation concentrates that, when sintered, assayed over 35% Mn. However, the lower-grade Chapin Group ore was not amenable to beneficiation.

1c-11. Concentration of Oxide Manganese Ore From Sheep Mountain Property, Durkee District, Ore. R. R. Wells and W. W. Agey. *Bureau of Mines, Report of Investigations* 4149, Nov. 1947, 7 pages.

The ore contained a portion of the siliceous gangue so closely associated with the manganese minerals that concentrates low in silica were not produced by ore dressing methods. However, enough coarse, barren gangue was present to permit effective gravity treatment for the production of intermediate-grade concentrates.

1c-12. Boy Scout-Jones and Moss-Richardson Molybdenum Deposits, Halifax County, N. C. A. F. Robertson, F. K. McIntosh, and T. J. Ballard. *Bureau of Mines, Report of Investigations* 4156, Dec. 1947, 9 pages.

Geology of the deposits; a description of the ore, which is mainly molybdenite; and sampling results. Results of a few beneficiation tests, which were not too successful.

1c-13. Concentration of Gravity Tailings From the Grasselli Deposit, Park City, Utah. T. F. Mitchell, W. G. Sandell, G. M. Potter, B. K. Shibler, and J. V. Batty. *Bureau of Mines, Report of Investigations* 4159, Dec. 1947, 18 pages.

The low-grade Pb-Zn-Ag gravity tailings from the Grasselli deposit were effectively concentrated in the laboratory by combined sizing, gravity concentration, and flotation procedures. As a result of the data obtained, a mill with a capacity of 1500 tons per day has been built. The treatment includes screening, spiraling of the screen undersize and jigging of the oversize, classification and grinding of the jig and spiral concentrates, and separate flotation of the ground concentrates and spiral slime.

1c-14. Electrowinning of Manganese From Domestic Ores. J. H. Jacobs. *Bureau of Mines, Report of Investigations* 4163, Dec. 1947, 19 pages.

Ores from Metals Reserve stockpiles were processed in the Bureau of Mines pilot plant, Boulder City, Nev., to determine their suitability for the production of electrolytic manganese. Manganese was produced successfully from all of the ores. Procedures used, with variations for specific ores, included roasting, leaching, thickening, and removal of impurities by precipitation with H_2S.

1c-15. Electrowinning of Cobalt From Cobaltite Concentrates. F. K. Shelton, J. C. Stahl, and Ruth E. Churchward. *Bureau of Mines, Report of Investigations* 4172, Jan. 1948, 98 pages.

Results of laboratory and pilot-plant research work on the recovery of electrolytic cobalt metal. Data on various steps, a recommended process, and alternative flow sheets that may be preferable under certain conditions. Considerable electrolytic cobalt was recovered during the pilot-plant operation, and the authors believe that the process is ready for large-scale commercial production. An estimate of construction and operating costs is given for a plant having a capacity of 4000 lb. of metallic cobalt per day.

1c-16. Treatment of Auriferous Sulphide Ore From Near Tawonga, Victoria. *University of Melbourne, Ore-Dressing Investigation* No. 310, 10 pages.

Results of routine tests.

1c-17. Mufulira Copper Mines, Limited, Concentrator, Northern Rhodesia. Jack White and Ralph B. Adair. *Mining Technology,* v. 12, Jan. 1948, T.P. 2250, 9 pages.

Practices, including flow charts of ore-crushing and flotation operations.

1c-18. Description of Concentrating Operations, Roan Antelope Copper Mines, Limited, Northern Rhodesia. M. R. Goldick. *Mining Technology,* v. 12, Jan. 1948, T.P. 2251, 16 pages.

Equipment and practices.

1c-19. Mercury Industry in Italy. Edwin B. Eckel. *Mining Technology,* v. 12, Jan. 1948, T.P. 2292, 21 pages.

Based on brief field examination and on data supplied by operators, records condition of Italian mercury industry as of March 1945. Principal mines, mining and metallurgical

methods, and manufacture of synthetic cinnabar.

1c-20. Gold Mining and Milling. Nathaniel Herz. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 86-87.

1947 developments.

1c-21. Oscillating Burner Cuts Sintering Costs. *Compressed Air Magazine,* v. 53, Feb. 1948, p. 47.

Through installation of recently patented ignition device, Consolidated Mining & Smelting Co. of Canada, Ltd., is now sintering lead concentrates with a saving in fuel consumption of 40%.

1c-22. Sur Quelques Cétones Bornyliques. (Remarks Concerning the Separation of Vanadium From Boron.) Georges Weiss and Pierre Blum. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1947, p. 1077-1079.

A method of separation based on the insolubility of barium vanadate in the presence of an excess of barite, and the solubility of barium borate under the same conditions. Application to a mixture of vanadium boride and oxides.

1c-23. Treatment of Tin-Silver Ore; Sociedad Minera Pirquitas, Picchetti y Cia., S. A. Argentina. *Deco Trefoil,* v. 12, Jan.-Feb. 1948, p. 5-12.

Flow diagram.

1c-24. Antimony Deposits in Alaska. Norman Ebbley, Jr. and Wilford S. Wright. *Bureau of Mines, Report of Investigation No.* 4173, Jan. 1948, 43 pages.

Results of some beneficiation tests.

1c-25. Yakobi Island Nickel Deposit; Sitka Mining District, Alaska. J. H. East, Jr., W. M. Traver, Jr., R. S. Sanford, and W. S. Wright. *Bureau of Mines, Report of Investigations No.* 4182, Jan. 1948, 29 pages.

Results of beneficiation tests using bulk flotation and differential flotation of copper and nickel.

1c-26. Knob Hill Mine Prospers on Newer Ore Discoveries. John B. Huttl. *Engineering and Mining Journal,* v. 149, March 1948, p. 56-59.

Geology and mining, milling, and concentration methods used at above gold-silver mine in north-central Washington. Flow sheet.

1c-27. Concentration of Lake Valley Mines Oxide Manganese Ore From Deming, N. Mex. K. C. Dean, H. G. Iverson, and J. A. McAllister. *Bureau of Mines, Report of Investigations* No. 4186, Feb. 1948, 8 pages.

Methods and results in an investigation of an ore reported to be representative of the type that would be mined for mill feed. Sample tested was found to be amenable to beneficiation by ore-dressing methods for the production of products that, when sintered, assayed over 44% Mn.

1c-28. Sidney Mine, Pine Creek Area, Shoshone County, Idaho. Robert M. Gammell and Robert J. Hundhausen. *Bureau of Mines, Report of Investigations* No. 4188, Feb. 1948, 11 pages.

Beneficiation tests on Zn and Pb concentrates as produced by selective flotation.

1c-29. Concentration of Urania Tin-Tungsten Ore From Bolivia, South America. G. M. Potter and W. G. Sandell. *Bureau of Mines, Report of Investigations* No. 4185, Feb. 1948, 10 pages.

Methods and results in an investigation of a complex Sn-W ore from the Urania mine (no uranium present). Best results were obtained by sulphide flotation followed by tabling and retreatment of the table products.

1c-30. Amalgamation of Some Alloys of Gold, Silver and Copper. Douglas Rennie Hudson. *Nature,* v. 161, Feb. 21, 1948, p. 288-289.

The thickness of the film required to make the surface greasy to the touch and lustrous in appearance was investigated for gold-rich alloys used in jewelry, for some silver alloys, and for some bronzes. Films of an order of thickness near 10^{-4} cm. were found sufficient. The results are said to be of value for amalgamation of gold concentrates.

1c-31. Synthesis of Some Sulpharsenites of Silver in Alkali Sulphide Solutions. Rene Beland. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 43, March-April 1948, p. 119-132.

Smithite, proustite, xanthoconite, wire silver, and argentite were prepared in concentrated alkali sulphide solutions at temperatures below 500° C. and pressures below 900 atm. The solutions were found to be chemically compatible with the gangue minerals found in epithermal silver veins. Therefore, the principal carriers for primary ruby silver ores are thought to be alkali sulphide solutions. The experimental results may explain some features of primary silver ores. 29 ref.

1c-32. Nchanga Consolidated Copper Mines, Ltd., Northern Rhodesia, South Africa. Part I—Development and Pilot Plant Operations. H. A. Talbot. *Deco Trefoil,* v. 12, March-April 1948, p. 5-12.

Location and history of the mine;

mineral composition; ore reserves; pilot-plant operations—1940 to 1945 inclusive; the crushing plant; grinding and classification; flotation and flotation reagents; conditioning; filtering and de-sliming of concentrates; concentrate handling; tailings disposal; and sampling and assaying.

1c-33. The Presence in Nature of Certain Stable Products of the Spontaneous Disintegration of Uranium. (In Russian.) V. G. Khlopin, E. K. Gerling, and N. V. Baranovskaya. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), Nov.-Dec. 1947, p. 599-604.

A formula based on the uranium and the xenon content of uranium ores is proposed for determination of the absolute age of the mineral. It is assumed that all isotopes of U undergo spontaneous disintegration. A specially designed apparatus and the method of its use for determination of the xenon content. 12 ref.

1c-34. Wet Grinding of Ferrosilicon for Heavy Media. E. H. Crabtree and T. C. King. *Mining Technology,* v. 12, March 1948, T.P. 2350, 6 pages.

The ferrosilicon grinding unit at the Central Mill of Eagle Picher Mining & Smelting Co. has demonstrated ability to supply a product of suitable size by wet grinding at a cost of 33% less than the corresponding purchased dry-ground ferrosilicon. Wet classification of ferrosilicon in closed circuit operation has been solved with a novel hydraulic classifier.

1c-35. Exploration, Development, Mining, and Milling of a Unique Tungsten Ore Body at the Yellow Pine Mine, Stibnite, Idaho. John W. Cole and H. D. Bailey. *Bureau of Mines, Information Circular* No. 7443, April 1948, 24 pages.

The ore body dealt with contains gold-bearing iron sulphides, stibnite, and scheelite. These minerals are distributed quite irregularly. Includes description of development of a satisfactory concentration flow sheet, including crushing, grinding, and flotation; and circuits for iron sulphide (from which gold is obtained), for antimony sulphide, and for high and low-grade tungsten. Cost analysis.

1c-36. How Oxidized Lead Ore is Floated at St. Anthony. E. V. Given. *Engineering and Mining Journal,* v. 149, April 1948, p. 88-90.

Refers to methods used at St. Anthony Mining & Development Co., Ltd., Tiger, Ariz. Oxide and sulphide ores are hoisted in the same shaft and crushed by the same equipment, but there they part company. Flow sheet for oxide ores.

1c-37. Search for Elements 94 and 93 in Nature. Presence of 94^{239} in Pitchblende. Glenn T. Seaborg and Morris L. Perlman. *Journal of the American Chemical Society,* v. 70, April 1948, p. 1571-1573.

A chemical method for separating and concentrating elements 94 and 93 from uranium and thorium, and results of its application to a sample of pitchblende concentrate from the Great Bear Lakes region of Canada.

1c-38. Theory of Metal Precipitation From Solutions by Means of Metallic Precipitating Agents. (In Russian.) I. N. Plaksin, N. A. Suvorovskaya, and O. K. Budnikova. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Jan. 1948, p. 131-138.

The influence of physicochemical factors such as solution temperature, intensity of stirring, and presence of different impurities on the precipitation of gold from cyanide solution by metallic Zn.

1c-39. San Francisco del Oro Metallurgy. *Mining World,* v. 10, May 1948, p. 16-18.

Method used to separate bulk concentrate into Pb and Cu concentrates by use of SO_2.

1c-40. La Métallurgie du Cuivre au Katanga. (The Metallurgy of Katanga Copper.) Maurice Rey. *Review de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 261-266.

Brief history of the area and its geology; and the extraction and reduction methods used in obtaining copper along with cobalt, tin, gold, and palladium.

1c-41. Laboratory Concentration of Complex Sulphide-Oxide Ore From Shenandoah-Dives Mine, Silverton, Colo. Heine Kenworthy. *Bureau of Mines, Report of Investigations* No. 4283, May 1948, 16 pages.

Results obtained in a laboratory investigation of an ore in which a mixture of clean sulphide and semi-oxidized material proved difficult to treat. Pb, Zn, Cu, Au, and Ag are recovered.

1c-42. Milling Practice at Idarado Mining Company. F. W. McQuiston. *Mining Technology,* v. 12, May 1948, T.P. 2349, 6 pages.

Company recovers Ag, Au, Cu, Pb, and Zn from a compound fis-

sure vein which has undergone several stages of mineralization. Flotation procedure, in which the major metallurgical problem is promotion of chalcopyrite in the presence of Zn and Fe depressants.

1c-43. Metallurgy at National Lead Co., MacIntyre Development. Frank R. Milliken. *Mining Technology,* v. 12, May 1948, T.P. 2355, 14 pages.

Metallurgical problems and developments, stressing ilmenite flotation. Five ore types are present: high and low-grade anorthosite ore; high-grade coarse-grained and fine-grained gabbro ore; and disseminated or low-grade gabbro ore.

1c-44. Flotation of Low-Grade Gold Ores at Golden Cycle Corp. Howard R. Keil. *Mining Technology,* v. 12, May 1948, T.P. 2361, 5 pages.

The gold ores from the Cripple Creek district are the highly siliceous sulfotellurides with approximately 3% total sulfides. These ores required a type of flotation machine that would give a rather violent aeration and agitation, which produced a fairly deep froth column containing not only the free mineral, principally pyrite, but also most of the middling product. The Fagergren type proved satisfactory.

1c-45. A Method for Adapting the Ammonia-Leaching Process to the Recovery of Copper and Nickel From Sulphide Ore and Concentrate. F. A. Forward, C. S. Samis, and V. Kudryk. *Canadian Mining and Metallurgical Bulletin,* v. 4, (*Transactions,* v. 51), June 1948, p. 250-355.

Principal steps in the process, procedure, and tables of results.

1c-46. Metallurgical Improvements in the Treatment of Copper-Nickel Ores. P. E. Queneau. *Canadian Mining and Metallurgical Bulletin,* v. 41, (*Transactions, v.* 51), June 1948, p. 356-367.

Improvements which have been introduced during recent years in the plants of the International Nickel Company of Canada, Ltd. Concentrator, smelter, Cu refinery and Ni refinery procedures.

1c-47. The Development of Copper Production at Mount Lyell. S. G. Salamy. *Mine & Quarry Engineering,* v. 14, June 1948, p. 169-174.

Geological and historical aspects of subject; flowsheets of concentration and smelting. Mining, crushing, grinding, flotation, smelting, and refining operations.

1c-48. Concentration of Copper-Cobalt Ores From the Blackbird District, Lemhi County, Idaho. H. R. Wells, W. G. Sandell, H. D. Snedden, and T. F. Mitchell. *Bureau of Mines, Report of Investigations* No. 4279, May 1948, 21 pages.

Results of laboratory and small-scale pilot-plant investigations of beneficiation.

1c-49. Nchanga Consolidated Copper Mines, Ltd.; Northern Rhodesia, South Africa, Part II. H. A. Talbot. *Deco Trefoil,* v. 12, May-June 1948, p. 5-12.

Primary crushing plant; washing plant; coarse-ore storage; secondary crushing and screening sections; grinding section; flotation section; concentrate handling; tailings disposal: flow sheet: future metallurgical practice; and present metallurgical practice.

1c-50. Bubble-Particle Contacts in Flotation. *Engineering and Mining Journal,* v. 149, July 1948, p. 95-97.

Photographs taken from consecutive frames of high-speed movies, taken through a microscope, of galena particles in contact with bubbles. Technique used in obtaining these pictures.

1c-51. Montana's Platinum Producer. W. H. Love. *Mining World,* v. 10, July 1948, p. 24-26.

Green Mountain Mining Co. successfully operates 50-ton plant to recover high-grade concentrate rich in platinum. Mineralization, and milling and concentration procedures. Copper, silver, and gold are also produced.

1c-52. Mining and Leaching Secondary Copper Ores. C. H. Thompson. *Mining Congress Journal,* v. 34, July 1948, p. 32-33, 54.

Leaching process devised to treat the little-known secondary copper ores of Carroll County, Va.

1c-53. New Chemical-Metallurgical Trends in the Treatment of Complex Iron-Nickel-Cobalt Ores. (In Russian.) G. G. Urazov and D. P. Bogatskii. *Izvestiya Academii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), no. 2, March-April 1948, p. 194-204.

An experimental and theoretical study of the physico-chemical nature of different Fe-Ni-Co ores was performed. This study provides basic data indicating the type of nickel complex compounds present in such materials which makes it possible to develop new methods for recovery of the metals. 16 ref.

1c-54. Values of pH in the Systems: $MeSO_4 + MeO + H_2O$. (In Russian.) B. V. Gromov. *Zhurnal Prikladnoi Khimii,* (Journal of Applied Chemistry), v. 21, March 1948, p. 260-272.

In the above equation "Me" stands for any metallic atom. Systems incorporating Zn, Cu, Cd, Al, Co, Fe, and Mn were studied. Applications to the hydrometallurgy of the nonferrous metals, and especially to that of zinc. 14 ref.

1c-55. Concentration of Miscellaneous Oxide Manganese Ores from Yavapai, Yuma, Maricopa, and Mohave Counties, Ariz. W. J. Long, J. V. Batty, and K. C. Dean. *Bureau of Mines, Report of Investigations* No. 4291, June 1948, 24 pages.

1c-56. Anaconda's Operation at Darwin Mines, Inyo County, California. Dudley L. Davis and E. C. Peterson. *Mining Technology,* v. 12, July 1948, T. P. 2407, 11 pages.

Geology, mineralization, mining, milling, and concentration procedures. There are four types of ore: high-grade Ag-Pb ores, milling-grade oxidized Pb-Ag ore, sulfide Pb-Zn milling ore, and high-grade tungsten ore.

1c-57. Diamond Drilling at the Tallapoosa Copper Mine, Haralson County, Ga. T. J. Ballard and F. K. McIntosh. *Bureau of Mines, Report of Investigations* No. 4316, July 1948, 8 pages.

Results of sampling and analysis.

1c-58. Concentration of Oxidized Lead and Copper Ores. Clarence Thom. *Deco Trefoil,* v. 12, July-Aug. 1948, p. 5-8.

Methods and laboratory test results.

1c-59. Investigation of Round Mountain Manganese Properties, Bland County, Va. M. H. Kline and A. F. Robertson. *Bureau of Mines, Report of Investigations* No. 4342, July 1948, 9 pages.

Gravity concentration and flotation tests. Flowsheet for manganese ore.

1c-60. Solubilité des principaux acides fixes des minerais d'uranium dans l'éther éthylique et coefficient de partage entre l'eau et l'éther éthylique. (Solubility of the Principal Fixed Acids of Uranium Minerals in Ethyl Ether and Partition Coefficient Between Water and Ethyl Ether.) M. Bachelet, E. Cheylan, and J. Le Bris. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 44, Nov.-Dec. 1947, p. 302-305.

Results of investigation permit evaluation of the extent of purification of uranyl nitrate by ether extraction.

1c-61. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XXIII. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, Aug. 1948, p. 509-514.

Deals with tantalum and columbium.

1c-62. North Carolina Tungsten. Frank H. Bishop. *Mining Congress Journal,* v. 34, Sept. 1948, p. 77-82.

Mining, milling, and concentration procedures. Flowsheet.

1c-63. Concentration of Richmond Hill Oxide Manganese Ore From Lead, Lawrence County, S. Dakota. G. M. Potter and K. C. Dean. *Bureau of Mines, Report of Investigations.* No. 4331, Aug. 1948, 8 pages.

Problems involved were liberation and rejection of silica and iron and removal of lead, silver, and gold from the manganese concentrates. The ore was found amenable to simple gravity methods of concentration for producing intermediate-grade products.

1c-64. Tungsten and Tantalum. James A. Lee. *Chemical Engineering,* v. 55, Sept. 1948, p. 110-112, 152-155.

Processes and equipment used to produce these metals from the ore concentrate. Chemical engineering unit operations play a prominent part.

1c-65. Recovery of Lithium From Its Various Ores and Salts. J. B. Cunningham and C. H. Gorski. *Bureau of Mines, Report of Investigations* No. 4321, Aug. 1948, 35 pages.

Lithium in the form of metal, salts, and alloys is particularly important because of increasing industrial uses resulting partly from wartime developments. Uses and methods for recovery.

1c-66. Concentration of Oxide Manganese Ores From the Aguila District, Arizona, W. G. Sandell and D. T. Holmes. *Bureau of Mines, Report of Investigations,* No. 4330, Aug. 1948, 10 pages.

Three representative lots of ore were obtained; these ores were studied to determine their amenability to concentration. The testing was sufficiently comprehensive to indicate the response of the ores to several different types of treatment.

1c-67. Investigation of the Dempsey Zinc-Lead Mine, Washington County, Mo. W. D. McMillan, M. M. Fine, and H. Kenworthy. *Bureau of Mines, Report of Investigations* No. 4332, Aug. 1948, 16 pages.

Results of ore-beneficiation tests.

1c-68. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XXIV. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, Sept. 1948, p. 611-621.

Thallium, thorium, and the rare earths — metallic and nonmetallic forms, including methods of concentration.

1c-69. Precipitation and Assaying of Cyanide Ores. Frank A. Seeton. *Deco Trefoil,* v. 12, Sept.-Oct. 1948, p. 4.

Three procedures said to have greater accuracy and speed than other accepted procedures.

1c-70. Radioactivity and Mineral Composition of Soil. (In English.) P. J. Hoogteijling and G. J. Sizoo. *Physica,* v. 14, Aug. 1948, p. 357-366.

It is shown that in sedimentary sands the radioactive elements are concentrated in the heavy-mineral fraction and chiefly bound to zircon. In clays no relation between the radioactivity and zircon content could be detected. A correlation between the potassium content and radioactivity of clays was found. The activity of some specimens of typical clay minerals was measured. No evidence was found for a concentration of the radioactive elements in any of these minerals. 15 ref.

1c-71. Concentration at the Midvale Mill. Rollin A. Pallanch. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 544-547.

Deals with Midvale, Utah, plant of U. S. Smelting, Refining, and Mining Co. Company where custom Pb-Zn-Fe ores are treated by flotation for recovery of Pb, Zn, Ag, and Au.

1c-72. Concentrating Lead-Zinc Ore at the Bayard Mill. P. V. Brough and K. B. Gillaspie. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 562-566.

Procedures and equipment of Bayard, N. Mex., mill of U. S. Smelting, Refining, and Mining Co. Flow sheet.

1c-73. Investigation of the Cape Resier Zinc-Copper-Lead Mine, Hancock County, Maine. S. B. Levin and Robert S. Sanford. *Bureau of Mines, Report of Investigations, No.* 4344, Sept. 1948, 18 pages.

Results of flotation tests on samples from this source.

1c-74. Diamond Drilling at the Big Ore Bank Magnetite Deposits, Lincoln County, N. C. Austin B. Clayton and W. Bruce Montgomery, Jr. *Bureau of Mines, Report of Investigations,* No. 4347, Sept. 1948, 6 pages.

Results of magnetic separation tests.

1c-75. Non-Ferrous Base Metals in Quebec. W. M. Bonham. *Canadian Mining Journal,* v. 69, Oct. 1948, p. 174-181.

Deposits, production facilities, and methods. Flow sheet for production of Cu and Zn concentrates. Noranda's pilot plant for production of elemental sulphur from iron sulphide. 13 ref.

1c-76. The Use of Ammoniacal Copper Sulphate in a High-Alkaline Pulp to Treat Contaminated Zinc Ore in Normetal Concentrator. F. C. Lendrum. *Canadian Mining and Metallurgical Bulletin,* Oct. 1948, p. 583-590.

Describes the ore; development of the present milling methods; milling operations, including flowsheet; and costs.

1c-77. Amalgamation of Tarnished Gold. H. T. Airey. *Canadian Mining and Metallurgical Bulletin,* Oct. 1948, p. 590.

Addition of an oxidizing agent proved useful.

1c-78. The Problem of the Floatability of Zinc Blende. (In Russian.) I. N. Plaksin, G. N. Khazhinskaya, and T. F. Brovkina. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 681-690.

Several possible ways to avoid difficulties encountered during the flotation of sphalerite. Optimum conditions of the process, including reagents used for different types of this ore. 10 ref.

1c-79. Flotation Practice at Maude and Yellow Girl Mine, Glen Wills, Victoria. Progress Report. *Council for Scientific and Industrial Research and University of Melbourne, Joint Investigation* No. 319, Jan. 23, 1948, 13 pages.

Results of an investigation to determine flotation characteristics of gold-bearing ore. Data on gold, sulphur, and arsenic assays and on amalgamation tests.

1c-80. The Influence of Flotation Reagents on the Hydrometallurgical Treatment of Products of the Concentration of Ores. (In Russian.) I. N. Plaksin and S. V. Bessonov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), June 1948, p. 883-888.

Results of an extensive study of the effect of flotation reagents on the recovery of gold in cyanidation. Application of the results to other similar problems. 12 ref.

1c-81. A Mill Designed for Easier Operation. Halder J. Rex. *Engineering and Mining Journal,* v. 149, Dec. 1948, p. 68-71.

New equipment and improved flowsheet of new 1500-ton concentrator.

1c-82. North Carolina an Important Tungsten Producer. M. H. Kline and F. K. McIntosh. *Engineering and Mining Journal,* v. 149, Dec. 1948, p. 79-81.
Includes concentration flowsneet.

1c-83. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XXVI. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, Nov. 1948, p. 750-759..
Deals with titanium and its compounds.

1c-84. Ein neues Verfahren zur Gewinnung von Wolframsäure aus Schlacken und Erzen. (A New Method for Producing Tungstic Acid From Slags and Ores.) Herbert Brintzinger, Fritz Rausch, and Martin Backhausen. *Zeitschrift fur anorganische Chemie,* v. 254, Dec. 1947, p. 287-288.
Chemical extraction procedure applicable to slags and ores containing as little as 0.9% WO_3.

1d—Light Metals

1d-1. Recovery of Alumina From Wyoming Anorthosite by the Lime-Soda Sinter Process. R. A. Brown, F. J. Cservenyak, R. G. Anderberg, H. J. Kandiner, and F. J. Frattali. *Bureau of Mines, Report of Investigations* 4132, Nov. 1947, 127 pages.
Small-scale tests supplemented by pilot-plant runs demonstrated that the alumina and soda occurring in the Wyoming anorthosite from the Laramie Range can be extracted and recovered satisfactorily by the lime-soda process. The sintered product from the rotary kiln can be dry-ground and extracted at temperatures up to 75° C. for periods up to 140 min. to effect recoveries of 80 and 77% of the Al_2O_3 and Na_2O, respectively.

1d-2. Elimination of Iron in Ammonium Sulphate Process for Production of Alumina From Clay. A. T. Sweet and G. Douglas Gardner. *Bureau of Mines, Report of Investigations* 4183, Jan. 1948, 13 pages.
The most satisfactory method of removing iron was the addition of calcined clay in the leaching step. This procedure involves no change in the regular leaching and crystallization flow sheet and causes most of the soluble iron to be precipitated, thereby preventing build-up of iron in the circulating liquors. The treatment has no appreciable effect on the extraction of alumina from the baked product, and little if any of the alumina in the calcined clay is extracted. 18 ref.

1d-3. Geochemistry of Beryllium. Michael Fleischer and E. N. Cameron. *Atomic Energy Commission,* MDDC 643, June 1946, 27 pages.
A review, with annotated bibliography, of the mode of occurrence of the element beryllium. Unpublished spectrographic studies of the Geological Survey on mill products are summarized. Data on domestic production and reserves and on foreign production. Suggestions for further investigations, particularly of methods of concentrating low-grade beryl ores, and of the occurrence of beryllium in American coals. 29 ref.

1d-4. Technology of the Extraction of Alumina From Ferrous Clays. (In Russian.) Ya. Ya. Dobonov, G. V. Medoks, and E. M. Soshestvenskaya. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Sept. 1947, p. 870-874.
A new variation of the sulphuric acid method for treatment of ferrous clays containing 18 to 20% Al_2O_3 resulted in a satisfactorily pure alumina in 63% yield. Heating with excess soda was unsatisfactory. 17 ref.

1d-5. Flotation of Beryllium Ores. J. S. Kennedy and R. G. O'Meara. *Bureau of Mines, Report of Investigations No.* 4166, Jan. 1948, 18 pages.
Work done in recovering pure metal from domestic deposits, and in the improvement of present metallurgical practice.

1d-6. Aluminum From Clay. *Journal of Chemical Education,* v. 25, March 1948, p. 159-162.
Two processes developed by the Bureau of Standards.

1d-7. A Process for the Production of Iron-Free Alum. Part 2. Pilot-Plant Development. William K. Cunningham, Edwin A. Gee, and R. August Heindl. *Bureau of Mines, Report of Investigations,* No. 4351, Sept. 1948, 60 pages.
A pilot-plant development for extraction of alumina from low-grade bauxite and clays demonstrated conclusively the chemical and mechanical feasibility of a solvent purification process for aluminum sulphate. Process is not economically feasible now.

SECTION II

SMELTING, REDUCTION AND REFINING

2a—General

2a-1. **Industry's Debt to Industrial Gases.** *Sheet Metal Worker*, v. 38, Dec. 1947, p. 53-54, 84.

Experiments with the use of oxygen to speed up melting operations in steel production and to remove stainless steel surface defects. Use of inert gases in the welding of magnesium, aluminum, copper and other metals and alloys difficult to weld.

2a-2. **Metal Production.** *Steel*, v. 122, Jan. 5, 1948, p. 258, 260, 262-263, 266, 268-270, 272-280, 283-285.

Brief reports on recent developments: New Developments in Lead Hindered by Heavy Demands, by Robert L. Ziegfeld; War Materials and Processes Find Many Civilian Uses, by L. W. Townsend; Service Conditions Accelerate Trend to Basic Refractories, by R. E. Birch; Suspended Roof Designed to Conserve Heat, by L. C. Hewitt; Copper and Brass Industry Uses High Production Unit, by D. K. Crampton; Aluminum Only Metal Cheaper Today Than Before the War, by David P. Reynolds; Economic Use of Heat Faces Blast Furnace Operators, by Charles E. Agnew; Wide Use for Stainless Clad Steel Is Predicted, by John R. Townsend; Stainless Producers Find Powder-Cutting Process Versatile Tool, by D. H. Fleming, Jr.; Operates Modern Laboratory for Testing Fireclay, by Britton T. Day; Develops Gun for Maintenance of Brickwork Above Slag Line, by Harvey N. Barrett; Advancements to Refine Production of Magnesium Alloys, by Charles E. Nelson; Concrete Reinforced Steel Advocated for Buildings, by Arthur A. Schwartz; High Purity Silica Brick Gives Increased Service Life, by S. M. Swain; High-Pressure Blowing Effects Reduction in Coke Rate, by Ralph H. Sweetser; Pig Iron Producers Struggle to Meet Demand, by Wilfred H. White; Use of Oxygen in Steelmaking Yields Constructive Data, by George V. Slottman; Oxygen Cutting Technique Boosted by Hot Cutoff Operations, by R. S. Babcock; Lancing Operations Cause Decided Rise in Temperature, by L. D. Culp; Sees Strong Indications of Return to Standard Steels, by Charles M. Parker; Cold Charging Is Bottleneck in Most Openhearth Plants, by J. S. Marsh; High-Temperature Corrosion Resistant Steel Developed, by C. A. Crawford; What Does Next Decade Promise by Way of Improvements? by John S. Unger; Trends in Steel Industry Swing Toward Refinements, by L. F. Reinartz; Coal Washing Facilities May Bring Needed Relief, by C. D. King; Oxidation Resistant Steels Conditioned by Powder Scarfing, by E. M. Holub; Flame Cutting Integrated With Rolling Mill Operations, by R. F. Helmkamp; Controls Furnace Operation by Temperature of Product, by Fred S. Bloom; Oxy-Acetylene Cutting Speeds Ship-Scrapping Operations, by B. H. Acomb; Large Sintering Facilities Required for Agglomeration, by W. J. Urban; Studies All-Basic Openhearth as Means of Increasing Output, by A. K. Moore; Powdered Iron Molding Used in Television Transformer Cores, by C. T. Martowicz; Oxygen Practice Still in Experimental Stage, by J. L. Schueler; More Designers Rely on Zinc Die-Casting Process, by R. Davison; Sees Undiscovered Possibilities for Oxygen in Openhearths, by J. H. Janssen; Use of Chromium-Silicon Steels for Springs Is Increasing, by F. P. Zimmerli; Decided Swing Toward Moly and Tungsten Steels Noted, by Norman F. Tisdale; Steel Oxygen Requirements Depend on Extent of End-Use, by J. H. Zimmerman; All-Basic Openhearth Is Proving Economical, by R. P. Heuer; Oxygen Has Many Uses in Iron and Steel Industry, by Frank E. Pavlis; Copper and Brass Products Improved by New Controls, by Herman W. Steinkraus; Experimental Work on Fusion Piercing Iron Ores Continues, by R. B. Aitchison; Anticipates Modernization Programs in Near Future, by A. L. Thurman; Large Hearth Blast Furnaces May Produce 1500 Tons, by

Owen R. Rice; Engineers Turn Attention to Merchant Mill Improvements, by G. G. Beard; Increased Use of Modified Malleable Iron Observed, by R. J. Cowan; Improved Production Method Used by Wire Industry, by Henry C. Boynton; Patents Indicate New Trend in Wrought Zinc-Base Alloys, by Oscar E. Harder.

2a-3. Alloys Made by Electric Ingot Process Have Improved Properties. H. R. Clauser. *Materials & Methods,* v. 27, Jan. 1948, p. 57-61.

How many of the defects common in steel produced by the usual means can be eliminated by a new process developed by M. W. Kellogg Co., which results in alloys free of segregation and having better properties.

2a-4. Metal Refining; Physical, Electrolytic and Chemical Methods. C. W. Dannatt. *Metal Industry,* v. 72, Jan. 2, 1948, p. 3-5; Jan. 9, 1948, p. 25-27.

Relationship between the various operations of ore treatment. Free-energy curves for various oxides for use in refining by preferential oxidation. (Presented before London Local Section of Institute of Metals).

2a-5. Vacuum Melting Techniques. J. D. Nisbet. *Iron Age,* v. 161, March 18, 1948, p. 79-82, 122.

Rigid purity specifications, particularly with respect to contamination by nonmetallic constituents require use of vacuum in the melting of many high-temperature alloys and of metals such as tungsten, molybdenum, chromium. Procedures for degassing molten metal involving the use of carbon and hydrogen. Problems usually encountered in vacuum-melting work.

2a-6. Vacuum Metallurgy. Harold A. Knight. *Scientific American,* v. 178, April 1948, p. 173-175.

Melting metals in the absence of gases to produce high-quality products.

2a-7. Basic Openhearth Slag Control. Part VII. Properties of Good Slags and Their Development. Charles R. Funk. *Blast Furnace and Steel Plant,* v. 36, May 1948, p. 539-549.

Data sheets showing characteristics of various type slags. Macrographs and micrographs of pancake test; and data on physical, chemical, and petrographic properties.

2a-8. Les Applications du Vide dans la Métallurgie. (Applications of Vacuum in Metallurgy.) L. Colombier. *Revue de Métallurgie,* v. 44, Nov.-Dec. 1947, p. 374-379; discussion, p. 379.

Development of vacuum smelting and casting. Applications of vacuum smelting and casting.

2a-9. Sinter Quality and Effect of Sinter on Blast Furnace Practice. J. L. Mauthe. *Blast Furnace and Steel Plant,* v. 36, July 1948, p. 817-824.

Results of tests carried out in recent years to develop a better understanding of the nature of sinters and their effect on blast-furnace operations.

2a-10. Seventy-Five Years of Progress in Smelting and Leaching of Ores. Frederick Laist. *Seventy-Five Years of Progress in the Mineral Industry, 1871-1946* (American Institute of Mining and Metallurgical Engineers), 1947, p. 126-161.

2a-11. Some Factors Influencing the Performance of Cupola Fuels. C. C. Wright. *Iron Age,* v. 162, Aug. 12, 1948, p. 72-77.

Metal-to-fuel ratio, metal composition, cupola diameter, moisture content of blast, fuel reactivity and fuel size.

2a-12. Cathodes With Low Potentials for Decreasing the Evolution of Hydrogen. (In Russian.) N. P. Fedot'ev, N. V. Berezina, and E. G. Kruglova. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 21, April 1948, p. 317-328.

Evolution of hydrogen causes difficulty during various electrochemical processes. 15 types of low-carbon and alloy steels were evaluated in an attempt to decrease this phenomenon, but the results were not encouraging. However, it was found that special surface treaments, such as sandblasting, or electroplating with certain nickel alloys, gave good results.

2a-13. The Constitution and Thermodynamics of Liquid Slags. F. D. Richardson. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 13 pages.

Present state of knowledge of the structure and thermodynamics of solid and liquid slags and slag constituents. The ionic and structural views as outlined are applied to two simple liquid slag systems—FeO and FeO-SiO_2

2a-14. The Thermodynamic Activity of Silica and of Oxides in Silicate Melts. M. Rey. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 8 pages.

A study on thermodynamic theory of solutions; the solidification curves in the silica-metallic oxide systems; activity of silica in binary silicate melts; activity of oxides; and the constitution of silicate melts.

2a-15. A Kinetic Study of the Dissociation of Carbon Monoxide Accompany-

ing the Reduction of Metallic Oxides. A. Juliard, R. Rayet, and A. Ludé. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 3 pages.

The catalytic action exerted by various solid phases on the Boudouard reaction during the reduction of metallic oxides by carbon monoxide. Experimental technique used consists of continuous, automatic measurement of the weight of an oxide sample in a stream of CO.

2a-16. The Reduction of Zinc Sulphide by Iron Under Reduced Pressure. P. Gross and M. Warrington. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 3 pages.

Thermodynamic data to show that the reaction between solid ZnS and gamma iron at reduced pressure occurs below 1000° C. Experiments show the rate at this temperature to be sufficient. Thermodynamic data show that the ratio of ZnS vapor to zinc vapor in contact with iron at 900-1000° C. is very small, and experiments show the rate of the exothermic reaction between ZnS vapor and gamma iron to be sufficiently high.

2a-17. A New Method for Studying the Mechanism of Roasting Reactions. E. A. Peretti. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 7 pages.

By using the new procedure the roasting of copper sulphides does not proceed primarily by formation of sulphates, as previously reported, but rather to Cu_2S and Cu_2O in the case of CuS and Cu_2S, respectively.

2a-18. The Primary Reactions in Roasting and Reduction Processes. J. S. Anderson. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 12 pages.

Some evidence derived from studies of semiconduction in oxide and sulphide systems.

2a-19. Studies in the Thermodynamics of Metallurgical Reduction Processes by Electrochemical Methods. B. A. Rose, G. J. Davis, and H. J. T. Ellingham. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 9 pages.

Possibilities of using electrochemical measurements as an aid were explored, with special reference to the influence of various factors on accuracy and reproducibility. E.M.F. or decomposition-voltage measurements were made on a variety of systems in order to obtain information on the reducibility of representative halides, oxides, and sulphides at temperatures up to 1000° K.

2a-20. Roasting and Reduction Processes—A General Survey. C. W. Dannatt and H. J. T. Ellingham. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 13 pages.

Occurrence of metal-bearing minerals: stages in the extraction of metals; applications of free-energy data; mechanism and rate of reactions in extraction processes; extraction processes in metallurgical practice; roasting and other chemical processes preceding reduction to metal; and reduction processes. Typical processes.

2a-21. Physico-Chemical Principles in Process Metallurgy. Charles F. Goodeve. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 14 pages.

Some of the more important principles concerned with the kinetic and thermodynamic approaches to metallurgical reactions.

2a-22. Activities in Liquid Metallic Solutions. John Chipman. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 27 pages.

Concepts of activity and thermodynamic equations involving it. Methods for determining activities illustrated by data on liquid metallic solutions. Concept of semi-regular solutions and its usefulness for metals.

2a-23. Ein Beitrag zur Deutung des Phänomens der umgekehrten Blockseigerung. (An Explanation of the Phenomenon of "Inverted" Ingot Segregation.) H. Röhrig. *Metall,* Feb. 1948, p. 33-35.

An explanation for the segregation of a portion of the alloy constituents at the surface of the ingot.

2a-24. Some Industrial Uses of Nitrogen and the Rare Gases. J. M. Crockett. *Metal Progress,* v. 54, Dec. 1948, p. 833-836.

Nitrogen, helium, and argon are being used increasingly for flushing hydrogen from liquid metals and for protective atmospheres in heat treating. In inert-gas shielded-arc welding, argon or helium is used to exclude air from the electrode, the arc, and the weld puddle.

2a-25. Beitrag zum Problem der Blockseigerung (Contribution to the Problem of Ingot Segregation.) Erich Scheil. *Metallforschung,* v. 2, March 1947, p. 69-75.

Possible causes of segregation and how to calculate the possible maximum segregation resulting from the decreasing volume of the solidifying melt. Theoretical and real examples are used to calculate the degree of dependence of segregation on composition. 23 ref.

2a-26. Variables Affecting Carbon Control in Cupola Operation. W. W. Levi. *Transactions of the American Found-*

rymen's Association, v. 55, 1947, p. 626-632.

Previously abstracted from *American Foundryman,* v. 12, Oct. 1947, p. 28-34. See item 14-317, 1947.

2b—Ferrous

2b-1. Practical Experience With the Use of Oxygen in Steelmaking. G. V. Slottman. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 331-336.

Experiences in the U. S. with the oxygenated-oil firing of openhearth furnaces and the use of oxygen as a bath reagent.

2b-2. Openhearth Charging Delays and Their Effect on Steel Production. John A. Warchol, Jr. *Blast Furnace and Steel Plant,* v. 35, Dec. 1947, p. 1479-1481.

Practical factors which should be investigated to insure minimum charging time; recommendations. (Presented at meeting of the Eastern Section of the National Open Hearth Committee, Philadelphia, Oct. 7, 1947.)

2b-3. Basic Openhearth Slag Control. (Concluded.) Part V. The Important Constituents of Basic Openhearth Slags and Some of Their Outstanding Properties. Charles R. Funk. *Blast Furnace and Steel Plant,* v. 35, Dec. 1947, p. 1490-1497, 1537.

Includes photomicrographs which show appearance of some of the constituents and their distribution in the slags.

2b-4. Oxygen and the Combustion Process. William A. Mueller. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 21-24.

Fundamentals of the use of nearly pure oxygen for oxidation of carbon in steel furnaces as compared with use of air. Dissociation heat losses and thermal capacities are plotted vs. temperatures.

2b-5. Efficiency of Fireclay Hot Tops in Steel Ingot Casting. J. W. Mueller. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 47-48.

Experimental work on different types of fireclay hot-top materials in an attempt to reduce head-end steel ingot croppage.

2b-6. High Pressure Operation; Full Scale Blast Furnace Trials. J. H. Slater. *Iron and Steel,* v. 20, Dec. 1947, p. 653-657.

Previously abstracted from *Blast Furnace and Steel Plant.* See 2-234 and 2-255, R.M.L., v. 4, 1947.

2b-7. Melting Steel and High-Duty Irons in an Oil-Fired Rotary Furnace. W. J. Roscrow. *Foundry Trade Journal,* v. 83, Dec. 11, 1947, p. 303-305.

Operating details of a 30-cwt. oil-fired Stein & Atkinson rotary furnace.

2b-8. Kinetics of Carbon Elimination From the Steel Bath. (In Russian.) L. A. Shvartsman, A. M. Samarin, and M. I. Temkin. *Zhurnal Fizicheskoi Khimii (Journal of Physical Chemistry),* v. 21, Sept. 1947, p. 1027-1032.

The investigation was conducted under very simple conditions; namely, in the absence of slags and with vigorous stirring of the molten metal, thus eliminating several sources of error. The rate of elimination is determined by the rate of carbon diffusion into the surface of the melt.

2b-9. Accelerating the Rate of Carbon Elimination of Openhearth Bath. J. N. Hornak. *Canadian Metals & Metallurgical Industries,* v. 10, Dec. 1947, p. 22-23.

Use of oxygen. (Condensed from paper presented at 1947 annual convention of the A.I.S.E.)

2b-10. Melting Cast Iron in Crucible Furnaces. *Canadian Metals & Metallurgical Industries,* v. 10, Dec. 1947, p. 23.

Recommended procedures.

2b-11. Electric Ingot Method for Continuous Casting Alloys. L. E. Browne. *Steel,* v. 122, Jan. 19, 1948, p. 74-76, 78.

Absolute control of liquefaction and solidification by Kellogg's recently perfected metallurgical process is expected to solve many high-temperature problems. Improvements in high speed toolsteels and in machinability of Cr-Ni stainless are among the other advantages. The melting speed of a single-ingot machine is about 7½ lb. per min.

2b-12. Openhearth Problems. Charles R. FonDersmith. *Steel,* v. 122, Jan. 19, 1948, p. 85-86, 88.

Work being done to improve methods, material, and equipment. (Presented before Eastern Section, National Open Hearth Committee, A.I.M.E., Philadelphia, Oct. 17, 1947.)

2b-13. The Revolution in Steel. Harry W. McQuaid. *Metal Progress,* v. 53, Jan. 1948, p. 75-78.

Trend to high production rates; the nonintegrated, semi-integrated and fully integrated steel plant; consumer-owned steel plants. Blast furnace economics; role of the converter; metallurgical oxygen; high tonnage electrics; billet-type ingots; thermo-chemistry of steelmaking; effect of aluminum in steel; hardenability specifications.

2b-14. Clean Steel From Electrics. S. W. Poole. *Metal Progress,* v. 53, Jan. 1948, p. 91-96.

Proceedings of 5th Electric Furnace Steel Conference of A.I.M.E., Pittsburgh, Dec. 1947, are reported.

2b-15. Method for Increasing Steel Ingot Yield. *Iron Age,* v. 161, Jan. 22, 1948, p. 55.

The process involves the procedure for making the ingot and isolating the segregate zone so that it can be cropped with a minimum loss of good steel. In making the ingot, standard killed-steel melting practice is followed, except that the steel is poured into a big-end-up mold of a taper two or three times that normally used on hot-top ingots. This is followed by press punching, upsetting, and forging. (Based on paper by G. A. Dornin, Jr., given at Electric Furnace Steel Conference, A.I.M.E.).

2b-16. Recent Advances in Steel Plant Furnace Operations. *Industrial Heating,* v. 15, Jan. 1948, p. 76, 78, 80, 82.

Reviews seven papers presented at special Panel on Coke Ovens, Blast Furnaces, and Steelmaking Furnaces, conducted by A.I.S.I. at its recent annual meeting in New York. Topics were: training of metallurgists; design for blast furnace hearths; blast furnace bell development; items of controllability in the openhearth combustion process; use of oxygen in openhearth practice for carbon reduction; mineralogy of openhearth slags.

2b-17. Oxygen in Steelmaking. William Mann. *Scientific American,* v. 178, Feb. 1948, p. 52-56.

Advantages and practical limitations.

2b-18. Eliminating Carbon With Oxygen. W. B. Arness. *Steel,* v. 122, Feb. 2, 1948, p. 120, 122, 125, 129-130, 133-134, 136, 138.

Summarizes results obtained at A. M. Byers Co. in eliminating carbon in about 1200 40-ton heats of commercial-quality electric furnace steel. Results were so satisfactory that oxygen is now largely used to supplant ore and other oxidizing materials.

2b-19. Influence of Carbon on the Equilibria Between Steel and Slag in the Acid Openhearth Furnace. P. Herasymenko. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 515-525.

Contrary to the previous conclusions, it is believed that equilibrium can easily be obtained for most of the slag-metal reactions taking place in acid openhearth heats. The reactions $Mn+FeO=MnO+Fe$, and $Si+2MnO=SiO_2+2Mn$; mechanism of the oxidation of carbon in the acid openhearth furnace. 11 ref.

2b-20. Electrolytic Manganese in Acid and Basic Electric Steel Foundry Practice and Basic Steel Ingot Production. F. Sillers, Jr., R. T. C. Rasmussen, and J. H. Jacobs. *Bureau of Mines, Report of Investigations* 4157, Dec. 1947, 24 pages.

Results of cooperative tests conducted in six commercial plants. They confirm the results of previous tests, namely, that electrolytic manganese is acceptable in place of regular grades of ferromanganese, except for price.

2b-21. Utilization of Oxygen in Smelting Low-Grade Ores. W. M. Pollitzer. *Steel,* v. 122, Feb. 16, 1948, p. 98, 101-102, 104. Based on Report PB-81385, Office of Technical Services, Department of Commerce, Washington.

Results of experiments with oxygen-enriched air in low-shaft German blast furnaces producing pig iron and ferrochrome. Use of oxygen in excess of 24 to 26% increases manganese in slag drastically. High temperature has little effect on furnace lining.

2b-22. Desulphurization of Iron at About 1100°. H. J. Tress *Chemistry & Industry,* Jan. 24, 1948, p. 57.

2b-23. Accelerating Carbon Elimination of the Openhearth Bath. J. N. Hornak. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. 39-45.

Test work done at Carnegie-Illinois, Homestead, Pa., to determine the most economical concentration of oxygen for carbon reduction. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 23, 1947.)

2b-24. Blast Furnaces Become Heat Economy Conscious. Owen R. Rice. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 54-56.

Various changes being considered, including abandoning use of hearth-cooling staves; improvement in operation of hot-blast stoves; use of high pressure; and use of oxygen.

2b-25. Openhearth Developments for 1947. W. C. Kitto. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 57-60.

A review.

2b-26. Developments in the Electric Furnace Industry During 1947. W. J. Reagan. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 61-63.

A review. Refers only to the steel industry.

2b-27. Oxygen in the Steel Industry—Past, Present and Future. George V. Slottman. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 64-69.

2b-28. Recent Problems and Developments in Steelmaking Controls. H. J. Forsyth. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 70-75.

Desulphurization of iron; use of

statistical methods in study of analysis fluctuation; progress in use of bath-temperature measurements; erosion of ladle nozzles and nozzle design; and ingot-mold studies.

2b-29. Oxygen Activities During 1947. J. H. Zimmerman. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 83-85.

New developments in uses in steelmaking furnaces; powder scarfing; and powder cutting.

2b-30. An Evaluation of Steel Cleanliness. Philip Schane, Jr. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 135.

The testing of steel for inclusions, requirements for various applications, causes of inclusions, and methods for their prevention or minimization. (Condensed from paper presented to 5th annual Conference on Electric-Furnace Steel, A.I.M.E., Pittsburgh, Dec. 4, 1947.)

2b-31. Ferrous Production Metallurgy. M. W. Lightner and Shadburn Marshall. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 111-113.

1947 developments.

2b-32. High Pressure Operation; Full Scale Blast Furnace Trials. (Concluded) J. H. Slater. *Iron and Steel,* v. 21, Jan. 1948, p. 15-17.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 35, Sept. 1947, p. 1083-1090; Oct. 1947, p. 1213-1218. See items 2-234 and 2-255, R.M.L., v. 4, 1947.

2b-33. A Quantitative Experimental Investigation of the Hydrogen and Nitrogen Contents of Steel During Commercial Melting. Clarence E. Sims, George A. Moore, and Donald W. Williams. *Metals Technology,* v. 15, Feb. 1948, T.P. 2347, 19 pages.

Results of an investigation sponsored by Steel Founders' Society of America at Battelle Memorial Institute. Hydrogen analyses of a precision considerably higher than any previously reported were made. Section 1 consists of a brief resumé of the literature. Section 2 describes the behavior of 20 commercial heats using the four usual methods, together with an analysis of the factors which affect the hydrogen content. It was found that sufficient hydrogen remains in test bars and castings to cause important reductions in ductility. Maintenance of a strong boil during steelmaking, and other precautions result in beneficial reduction of hydrogen especially in the acid arc furnace. 13 ref. (Complete experimental data are available on Recordak film upon request to Battelle Memorial Institute, Columbus, Ohio.)

2b-34. Mold-Weight/Ingot-Weight Ratio and Its Relation to Mold Consumption. N. H. Bacon. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 81-95.

Comprehensive data provided by three Ingot Molds Sub-Committee questionnaires (one prewar and two postwar) and B.I.O.S. Final Report No. 685, "German Ingot Molds for the Casting of Steel Ingots", have been evaluated. The importance of the mold-weight/ingot-weight ratio in its relation to mold consumption has been established. Attention is drawn to the very large variations in this ratio found within the United Kingdom and Germany and possible reasons for such variations are suggested. A graph is given showing the apparent optimum ratio for molds of capacities of more than 18 cwt.

2b-35. Ingot Surface Defects; Formaof "Double Skin" or "Curtaining" on Top-Poured Mild Steel Ingots. P. Walker. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 96-98.

Work conducted to determine the cause of these defects. Results indicate that two factors are of significance: trapping of deoxidation slag near the ingot surface during solidification and splash moving forward from the mold wall and allowing liquid steel to flow behind it.

2b–36. Oxygen in Steelworks. *Metallurgia,* v. 37, Jan. 1948, p. 117-118.

Reviews recent progress.

2b-37. The Oxygen Blast—a New Step in Metallurgical Developments. (In Russian.) I. P. Bardin. *Izvestiya Akademii Nauk SSSR, Otdelnie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Oct. 1947, p. 1363-1368.

Present status of the above development in the U.S.S.R. and elsewhere. Improvements made possible and avenues for future research.

2b-38. Bunched Openhearth Heats and Suggestions for Their Prevention. Robert K. Harris. *Blast Furnace and Steel Plant,* v. 36, Feb. 1948, p. 205-211.

An extended description of scheduling methods used to prevent "bunching" of the heats which results in alternate periods of rush and slack work at the floor laboratory, main laboratory, openhearth pit, stripper, soaking pits, moldyard, stockyard, floor, and blast furnace.

2b-39. Oxygen Uses in Steel Production. *Industrial Heating,* v. 15, Feb. 1948, p. 262, 264, 266.

Reviews paper by J. H. Zimmerman. (Presented at recent A.I.S.E. meeting, Pittsburgh.)

2b-40. Oxygen Uses in Steel Production. J. H. Zimmerman. *Iron and Steel*

Engineer, v. 25, Feb. 1948, p. 35-43; discussion, p. 43-44.

Summarizes much of the development and research work which has been done on the use of oxygen in the openhearth. (Presented at A.I.-S.E. Annual Convention, Pittsburgh, Pa., Sept. 23, 1947.)

2b-41. Difficulties Involved in Producing Sound Ingots. Robert L. Stephenson. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 158, 160.

Fundamental factors and experimental results. The most important factors are said to be chemical composition of the steel and time from finish pour to charge in the soaking pits or "track time". Structures formed on solidification and phase transformations. (Condensed from paper presented to 5th Annual Conference on Electric Furnace Steel, A.I.M.E., Pittsburgh, Dec. 4, 1947.)

2b-42. The Mineralogy of Basic Openhearth Slags. J. L. Mauthe and K. L. Fetters. *Yearbook of the American Iron and Steel Institute,* 1947, p. 264-297; discussion, p. 297-298.

Reviews and correlates some of the more important data from the literature and gives a few examples of the application of mineralogy to openhearth slags. 28 ref. (Presented at A.I.S.I. meeting New York, May 21-22, 1947.)

2b-43. New Process to Make Specialized Alloy Steels. *Petroleum Engineer,* v. 19, Feb. 1948, p. 92.

Electric ingot method for continuous metal casting developed by M. W. Kellogg Co. Alloying elements are continuously fed at a controlled rate into an electrical apparatus from which air is excluded, and in which an ingot of any desired analysis is produced by progressive solidification.

2b-44. Some Effects of Melting Practice on Properties of Medium-Carbon Low-Alloy Cast Steel. J. G. Kura and N. H. Keyser. *American Foundrymen's Assoc., Preprint No.* 47-4, 1947, 12 pages.

Notched-bar impact properties and hardenability of medium-carbon, Mn-Mo cast steels produced by eight different melting practices. The principal influence of melting practice on the properties appeared to be through control of sulphur content and sulphide distribution. Some variations in hardenability could not be accounted for by chemistry. However, no distinct or consistent influence of any one type of melting or deoxidation practice on hardenability was apparent.

2b-45. Slag Control in the Acid Electric Furnace. H. H. Johnson, M. T. McDonough, and D. L. Radford. *American Foundrymen's Assoc., Preprint No.* 47-19, 1947, 12 pages.

Results of a study of some of the characteristics of acid electric furnace slags, together with some applications of these characteristics to serve as a guide for such furnace practice. 10 ref.

2b-46. Cupola Melting Phenomena. E. V. Somers and D. W. Gunther. *American Foundrymen's Assoc., Preprint No.* 47-51, 1947, 6 pages.

Results of this investigation determine the variation of both chemical and physical properties of iron with a charge of constant composition and variation of physical properties with tapping temperature at constant chemical composition of the iron plus a constant percentage of inoculating addition.

2b-47. Oxygen in the Bessemer Converter. *Iron Age,* v. 161, Feb. 19, 1948, p. 70. Based on condensed translation from *Engineers' Digest* (American Edition), v. 4, Nov. 1947, p. 522-523.

Previously abstracted from latter source. See item 2-303, R.M.L., v. 4, 1947.

2b-48. Stresses Optimum Conditions for Economy and High Production. *Steel,* v. 122, Feb. 23, 1948, p. 115.

Outlines talk by Karl L. Fetters entitled "Slag Control in the Economics of Steel Production", which summarized the chemistry, mineralogy, control, and operating significance of basic openhearth slags. (Presented to Pittsburgh Chapter, A.S.M., Jan. 8, 1948.)

2b-49. A Producao de Gusa em Altos Fornos Elétricos Pela Antiga Companhia Eletro-Metalurgica Brasileira, em Ribeirao Preto. (Electric Blast Furnace Production of Cast Iron By the Brazilian Electro-Metallurgical Co., Ribeirao Preto.) Martinho Prado Uchoa. *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 667-683; discussion, p. 683.

The production of cast iron by the method adopted in the above plant. Bessemer converters are linked with Ludlum electric furnaces and rolling mills.

2b-50. Apanahado de Varios Processos de Reducao em Fornos Elétricos em Face das Condicoes Brasileiras. (Suitability of Various Reduction Processes in Electric Furnaces to Brazilian Conditons.) *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 706-716; discussion, p. 717-718.

Reduction of Brazilian ores and production of cast iron, calcium carbonate, ferro-alloys, and aluminum in electric furnaces. Characteristics of

the Tysland-Hole furnace and use of Soderberg electrodes. (A report prepared by the Norwegian firm, Electrokemisk A/S, and then translated into Portuguese.)

2b-51. Method for Control of the Slagging Process in Openhearth Furnaces. (In Russian.) Iu. I. Usatenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1430-1434.

New method is based on determination of the alkalinity of water-alchol suspensions of the slags. Data show that basicity of the slags has a definite relationship to the alkalinity of the suspensions.

2b-52. Zur Kenntnis der Reduktion von Eisenoxyden mit Wasserstoff und Kohlenmonoxyd. (Contribution to Study of the Reduction of Iron Oxides With Hydrogen and Carbon Monoxide.) H. J. Liebu. *Schweizer Archiv fuer Angewandte Wissenschaft und Technik,* v. 14, Jan. 1948, p. 1-19.

Part I compares the action of the two gases in the reduction of ferric oxide and the effects of various physical properties such as grain size, porosity, method of preparation of the iron oxide, and current density. 62 ref. (To be continued.)

2b-53. High Top Pressure Operation. James Review. *Iron and Steel,* v. 21, Feb. 1948, p. 45-47.

A digest of recent literature concerning operation of blast furnaces at top pressures above atmospheric.

2b-54. Lean Ores; Why Not a Departure From Tradition? *Iron and Steel,* v. 21, Feb. 1948, p. 55-56.

A method based on thermochemical considerations of using lean ores more economically than in the blast furnace, as a process complementary to blast-furnace practice.

2b-55. Making Merchant Pig Iron at Duluth in Winter Entails Starting With Frozen Iron Ore. *Skillings Mining Review,* v. 36, Feb. 14, 1948, p. 1.

Unique year-around operations of Interlake Iron Corp.

2b-56. Basic Openhearth Slag Control. Part VI. Relationship of Mineralogical Composition and the Appearance of the Slag Pancake. Charles R. Funk. *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 332-336.

2b-57. Contribution a l'Etude de la Durée des Lingotieres. (Contribution to the Study of the Life of Ingot Molds.) Robert Stumper. *Revue de Métallurgie,* v. 44, July-Aug. 1947, p. 228-233.

Metallographic examination of a number of molds of the same type indicated that cracking of "synthetic" cast iron could be attributed to a predominantly pearlitic structure. The method of treatment of this type of cast iron produces super-heated, oxidized cast iron, rich in gas. 12 ref.

2b-58. Nagra Erferenheter Vid Sintring Med Okat Undertryck. (Some Notes on Vacuum Sintering.) Sven Jansson and Christer Danielsson. *Jernkontorets Annaler,* v. 132, no. 1, 1948, p. 15-26.

Iron ore for production of high-phosphorus pig iron for the basic bessemer process was sintered commercially under 3 degrees of vacuum. It was found that the rate of sintering increases in proportion to the square root of the vacuum, that relative resistance to passage of air is changed only slightly, that energy consumption increases in proportion to the vacuum, and that quality of the sinter is not affected.

2b-59. The Use of Oxygen in Openhearth Furnaces. E. C. McDonald. *Iron and Steel Engineer,* v. 25, March 1948, p. 37-43; discussion, p. 43.

Data obtained from experience in making 770 heats using a combination of oxygen through the burners, and direct injection into the bath by means of a submerged pipe or lance. Burner design and arrangement of piping. The two problems still to be solved are refractory life (in the roofs) and fumes emitted from the stack during lancing. Design changes made in an attempt to increase roof life have so far been largely unsuccessful. Spray-tower washing for fume and dust removal has been quite successful. The benefits derived from use of oxygen. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 23, 1947.)

2b-60. Use of Graphite as a Substitute for Pig Iron. R. J. Meyers. *Iron and Steel Engineer,* v. 25, March 1948, p. 104. A condensation.

On several occasions, graphite was substituted for pig iron and the amount of high-silicon scrap was increased to compensate for the lower silicon content of the charge. Analysis indicates that approximately 7% per ton of metallic charge can be saved by substituting graphite or coke for most of the pig iron in the standard charge. However objectionable features were weighed against the lower cost and it was decided to return to pig iron whenever available. (Presented at meeting of Open Hearth Division, A.I.M.E., Philadelphia, Nov. 7, 1947.)

2b-61. Comments on Furnace Practice in Western Europe. W. B. Wallis. *Journal of the Electrochemical Society,* v. 93, March 1948, p. 46N-50N.

Ferro-alloys; smelting furnaces; melting furnaces; electrodes; and future developments. Deals only with the iron and steel industry.

2b-62. Sponge Iron in Japan. Theo. L. Johnston. *Bureau of Mines, Information Circular* No. 7440, March 1948, 12 pages.

Of the various methods used, the rotary-kiln method was the most important and accounted for 646,000 metric tons from 1939 to 1945. Various difficulties encountered. Most of the ores contained small amounts of Ni and Cr, which were recovered in the product which was used for alloy-steel production in the electric furnace. Attempts to make sponge iron by the Swedish sagger method were successful in Manchuria, but unsuccessful in Japan itself on account of low-grade ores and coals available for the latter. Use of electric furnaces for smelting iron ore.

2b-63. Melting of Quality Basic Electric Steel. T. V. Simpkinson. *Canadian Mining and Metallurgical Bulletin,* v. 41, March 1948, p. 127-137.

A brief history of the electric-arc furnace process of steelmaking. The greater relative importance of this method of steel manufacture to the Canadian steel industry, as compared with its importance in the steel industry of the U. S. The scope of the process; difficulty of obtaining melting stock low in alloy content. The physical chemistry of steelmaking, with emphasis on oxidation, deoxidation, and the role of hydrogen. Carbide-type and silicon-type slags. (To be presented at annual meeting, Canadian Institute of Mining and Metallurgy, Vancouver, B. C., April 1948.)

2b-64. Electric Hot Topping Steel Ingots. E. S. Kopecki. *Iron Age,* v. 161, March 25, 1948, p. 80-86.

Method offers the steelmaker a means for obtaining an increased and more consistent yield of sound ingot metal. Proved economically and metallurgically practical, the process has already been applied in the manufacture of a wide variety of steels and high-temperature alloys.

2b-65. Combustion Oxygen in the Openhearth. *Iron Age,* v. 161, March 25, 1948, p. 87-89. Condensed from "Operation of Oxygen-Enriched Openhearth Furnaces," by J. S. Marsh.

Experiences of Bethlehem Steel Co. in making some 400 experimen- tal heats with burner injection o oxygen. (Presented at annua A.I.M.E. meeting, held recently i New York.)

2b-66. Estimation of the Compositio of Oxidizing Slags in Electric-Ar Furnaces. (In Russian.) A. M. Sam- arin, A. Yu. Polyakov, and L. A Shvartsman. *Izvestiya Akademii Nau SSSR, Otdelenie Tekhnicheskik Nauk* (Bulletin of the Academy o Sciences of the U.S.S.R., Section o Technical Sciences), Dec. 1947, p. 1639- 1648.

In order to estimate the slag con- tent, it is necessary to know th oxygen content, which in turn i based on the carburization-decar- burization equilibrium and the fer- rous oxide activity. How to deter- mine slag composition on the basi of charts developed by the author 11 ref.

2b-67. Tillstandsdiagram för Basisk Stalslagger, Litteraturöversikt. (Phas Diagrams for Basic Steel Slags; Li- terature Review.) Holger Pettersson *Jerkontorets Annaler,* v. 132, no. 2 1948, p. 42-56.

Available diagrams are describe and discussed with regard to Swed- ish basic open-hearth slags. 51 ref

2b-68. Zur Kenntnis der Reduktio von Eisenoxyden mit Wasserstoff un Kohlenmonoxyd. (Reduction of Iro Oxides by Hydrogen and Carbo Monoxide.) (Continued.) H. J. Leibu *Schweizer Archiv,* v. 14, Feb. 1948, p 49-59.

The relationship between the tem- perature and course of the reaction

2b-69. The Use of Sponge Iron fo Steel Production in Sweden. M. Tiger- schiold and S. Eketorp. *Metallurgia* v. 37, Feb. 1948, p. 167-177. Translate and condensed from a paper by M Tigerschiold and from some note from a lecture by S. Eketorp, Shef- field, Oct. 1947.

The main developments of th sponge-iron process. The Hoganä and Wiberg methods, with particu- lar attention to the economic as- pects of their application. Calcula- tion of the composition of spong iron from different raw material production costs of sponge iron earlier sponge-iron melting prac- tice; melting and cost calculation for steel made from sponge iron comparison of the value of spong and pig irons; and consideration affecting the method of productio and the raw material. 21 ref.

2b-70. Vitamins for Iron. *Inco,* v. 2 Spring 1948, p. 22-23.

Inoculation of gray-iron castin

with "Nisiloy", a product containing approximately 60% Ni, 30% Si, and 10% Fe, to improve machinability, and achieve other beneficial results.

2b-71. Sponge Iron and Iron Powder. J. F. Drapeau. *Iron Age,* v. 161, April 8, 1948, p. 92-94.

A continuous sponge iron-iron powder setup, for converting iron scale to high-quality annealed and unannealed iron powders. Plans for the introduction of new and improved ferrous powders manufactured by procedures not previously employed in the industry.

2b-72. Slag Control and Determination of Optimum Slag Composition in Basic Openhearth Practice. A. J. Kesterton. *Iron and Steel Institute, Special Report No.* 39, "Reports of the Affiliated Local Societies", Dec. 1947, p. 38-49.

Determination of optimum tapping-slag composition as a target for the operation of a slag-control technique in relation to the manufacture of rimming steel. The dissolved-oxygen requirement at tapping for good rimming action, and the relationship between dissolved oxygen and slag composition. At a given carbon concentration, the rimming action is controlled by the dissolved oxygen, which in turn is controlled by the slag FeO, provided that basicity is constant. How the effect of slag composition on removal of sulphur and phosphorus to below the specification limits can be calculated. Current methods for control of tapping-slag compositions. 12 ref. (Presented at meeting of Cleveland Institution of Engineers, Middlesbrough, England, Feb. 11, 1946.)

2b-73. Boiling of Liquid Metal in the Bath of a Steel-Melting Furnace. (In Russian.) V. S. Kocho. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1527-1530.

The intensity of the process of liquid-metal and slag boiling in the bath of the steel furnace. Dependence between optimum rate of carbon burn-out and intensity of the boiling process was established. 13 ref.

2b-74. Contribution a l'Etude de la Cementation de la Fonte par Quelques Métalloides et Métaux. La Cémentation "Dispersée". (Study of Cementation of Cast Iron Using Certain Metalloids and Metals. "Dispersed" Cementation.) Louis-Fernand Girardet and Andre Guedras. *Fonderie,* Dec. 1947, p. 970-973; discussion, p. 973-974.

Cementation using ferrous alloys and PbS, and also "dispersed" cementation using PbO, ZnS, ZnO, SnS, SnO_2, and Sb_2S_3.

2b-75. Openhearth Furnace Models. A. R. Philip. *Nature,* v. 161, March 27, 1948, p. 479.

Recent large-scale experiments on openhearth furnaces emphasize the need for more fundamental knowledge of the flow of fuel, air, and combustion products through the furnace chamber. Plastic models of openhearth furnaces with differing port designs were made on a 1/24 linear scale. Both fuel gas and air flow through the model were studied using a variety of methods. At present fine aluminum particles suspended in water, and illuminated by intense light, are used. By suitably compounding the 2-dimensional patterns thus obtained, a 3-dimensional flow pattern is formed.

2b-76. Enriched Blast; German Use of Oxygen in Blast Furnaces and Converters. *Iron and Steel,* v. 21, April 1948, p. 129-132. Condensed from F.I.A.T. Report No. 1203.

In one blast-furnace plant, one low-shaft blast-furnace plant, and one converter plant. Achievements and data as well as novel ideas.

2b-77. Oxygen Enrichment of the Cupola Blast. A. K. Higgins. *Iron Age,* v. 161, April 22, 1948, p. 72-77.

The possibility of increasing melting temperatures, reducing initial melting time, and boosting melting rates by use of oxygen. Cupola runs with and without enrichment and the effect of oxygen additions on temperatures, lining life, metal analysis, and results obtained with intermittent enrichment.

2b-78. Source of Sulphur Entering Steel Disclosed by Radioactive Tracers. *Steel,* v. 122, April 26, 1948, p. 112.

Outlines results of largest tracer experiment ever conducted, and probably the first using full-scale industrial equipment. The experiment was conducted in Republic Steel's Cleveland plant by Arthur D. Little, Inc. The proportion of the coke's sulphur which had come from the pyrites was found to be about the same as in the original coal, indicating that both forms are carried over to the coke equally, and that there is no advantage in buying coal with a low pyritic-sulphur content. Potentialities for other metallurgical problems.

2b-79. Improvement of Machinability in High Phosphorus Gray Cast Iron. William W. Austin, Jr. *American*

Foundrymen's Association, Preprint No. 48-21, 1948, 14 pages.

Following review of the literature, an attempt to find commercially feasible means of overcoming the harmful effects of phosphorus upon machinability was made. The three fundamental methods of approach followed were: Modification of the mode of occurrence of the phosphide constituent in the microstructure; control of the microstructure exclusive of the phosphide constituent; and removal of constituents known to have adverse effects on machinability. Significant improvement may be attained by a combined treatment involving sodium carbonate desulphurization and Zr-alloy addition. 30 ref.

2b-80. Sira v Koksu. (Sulphur in Coke.) Jindrich Sarek. *Hutnické Listy* (Metallurgical Topics), v. 3, Jan. 1948, p. 9-11.

Consideration of the literature concerning small blast furnaces fired with charcoal led to the conclusion that present furnaces could be run acid with smaller coke sulphur content, at least in some cases. This would result in a decrease of fuel and limestone consumption and in lowering of production costs. The savings in coke and limestone.

2b-81. Direct Oxidation. Edward B. Hughes. *Proceedings National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 14-32; discussion, p. 32.

The term "direct oxidation" refers to use of elemental oxygen introduced directly into the openhearth bath. Describes what is being done at present with a supply of 1,000,000 cu. ft. per mo. at $3.35 per cu. ft. ($80.40 a ton) at Wheeling Steel Corp. Data from typical heats.

2b-82. Application of the Shaker Device to Medium Carbon Rimmed Steels. Mark Geigel. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 33-42.

Theory and practice of the production of rimmed-steel ingots of good quality. Various devices are used to secure satisfactory elimination of gases from the molten metal, thus decreasing porosity and other inhomogeneities. Shaking device and its operation. Comparative results from "shaker" and regular ingots are shown by macrographs and by distribution of C, Mn, S, and P at various locations within the ingots. The shaking process was shown to be of value in production of rimmed steel of improved structure and physical properties, and carbon contents.

2b-83. Quality of Hot Metal. L. A. Lambing. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 62-65; discussion, p. 65-67.

Types of metallic charge and recommended alloy contents. Results of questionnaire on hot-metal quality and use of duplex processes.

2b-84. Use of Oxygen in Openhearth Furnaces. J. J. Golden. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 68-73; discussion p. 73-74.

Results of a survey of the various types of burners used. The most important difference is the wide variation in the areas of the oxygen outlets. Some flame-radiation data and results of use of the oxygen lance for carbon removal. Possibility that the latter might be the more economical of the two methods.

2b-85. Use of Oxygen at East Works, American Rolling Mill Co. H. V. Flagg. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 74-76; discussion, p. 76-82.

With experiences in use of oxygen at several plants, also.

2b-86. Pig-Iron Substitutes in Basic Practice. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 114-123.

Brief papers or discussions by E. J. Nelson, R. R. Fayles, H. L. Tear, W. H. Steinheider, A. E. Getz, G. L. McMillen, R. L. Baldwin, and A. R. Altman giving experiences at various mills.

2b-87. Recarburization of Soft Melts. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 123-127.

W. H. Carpenter discusses use of oil for recarburizing soft melts; A. E. Getz describes procedure of Keystone Steel and Wire Co; R. R. Fayles discusses use of graphite for reboiling soft-melt heats; and R. J. Zemaneck describes injection of carbon into the bath.

2b-88. Deoxidation Practice in Basic Steel Foundries. G. A. Lillieqvist. *Proceedings, National Open Hearth*

Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, v. 30, 1947, p. 128-135; discussion, p. 135-142.

Importance of proper deoxidation; pinhole porosity; effect of aluminum additions on inclusions and physical properties; method of adding aluminum; use of selenium additions; and effect of slag on deoxidation. Extended discussion under the headings: hydrogen in cast steel; fluidity of furnace filled vs. ladle-killed openhearth heats; and relation of fluidity to composition and temperature.

2b-89. Steel Quality and Steel Castings. C. B. Jenni. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 143-145; discussion, p. 145.

Important factors in production of basic openhearth steel for use in cast-steel products.

2b-90. The Mechanism of the Carbon-Oxygen Reaction in Steelmaking. C. E. Sims. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 146-159; discussion, p. 160, 164-168. Reprinted from *Electric Furnace Steel Proceedings,* 1946.

(Presented at Electric Furnace Steel Conference, Dec. 5, 1946.)

2b-91. Furnace Deoxidation in Basic Openhearth Practice. W. O. Philbrook. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 168-171; discussion, p. 172-179.

Recent work and developments in the field of deoxidation practice. Analyzes the present state of our knowledge to see what deficiencies still exist. Discussion by R. H. Isenberg, J. F. Pollack, D. C. Hilty, B. M. Larsen, Charles Labeka, and C. F. Christopher. 10 ref.

2b-92. Temperature Considerations in the Solidification of Killed Steel Ingots J. W. Spretnak. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 187-192; discussion, p. 193-194.

Experimental data and a theoretical analysis. Effect of superheat; the air gap; effect of mold-wall thickness on rate or heat abstraction; effect of initial mold-wall temperature on primary structure; time for completion of solidification; and heat balance in the freezing of ingots.

2b-93. Use of Water on Hot-Topped Steel at the Pouring Platform. G. W. Humes. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 194-196; discussion, p. 196.

Method followed resulted in reduction of holding time on the platform from 2 hr. to 45 min. after pouring.

2b-94. Manufacture of Openhearth Steel to Hardenability Specifications. Frederick M. Washburn. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 197-200; discussion, p. 200-201.

Development of satisfactory methods and specifications.

2b-95. Control of Sulphur in the Openhearth. G. L. Plimpton. *Proceedings, National Openhearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 234-237; discussion 237-245.

Summarizes replies to a questionnaire sent to seven plants in the Chicago district dealing with raw materials, working practices, and quality in relation to sulphur content. Extensive discussion includes prepared contributions by H. L. Allen, W. J. Reilly, A. E. Reinhard, and extemporaneous discussion brought forth by a series of questions. Among the topics considered in the latter are: sulphur pickup from fuel; sulphur elimination with spiegel and ferromanganese; slag basicity and sulphur; effect of lime solution on sulphur; and sulphur from high hot-metal charges.

2b-96. Mold Practice. L. R. Berner. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 245-248; discussion, p. 248-252.

Based on a recent survey of mold practice for ingot casting made throughout the steel industry, in an attempt to determine the factors affecting mold life and to bring to light any recent developments or practices that might effect general improvement.

2b-97. Effect of Nozzle Size on Surface Quality of Slab Product of Low-Carbon Rimmed Steel. C. Hunter. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 260-264; discussion, p. 264-266.

Previously abstracted from con-

densation in *Industrial Heating,* v. 14, Nov. 1947, p. 1860, 1862. See item 2-300, R.M.L., v. 4, 1947.

2b-98. Hot Tops in Relation to Ingot Soundness. E. W. Pierce. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v.30, 1947, p. 267-269; discussion, p. 269-272.

Results of experiments made over a 6-mo. period to compare the effect of type of hot top on resulting ingot soundness.

2b-99. Washing or Flushing Acid Openhearth Steel With Inert Gas. P. M. Hulme. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 273-278; discussion, p. 278-281.

Results which indicate the value of above procedure for eliminating porosity and hydrogen.

2b-100. Question Period. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 297-303.

Basic brick in acid openhearth furnaces; effects of substitutes for pig iron on furnace operation; and changes in charge analyses to take care of reduction of pig iron.

2b-101. Oxygen in the Steel Industry. H. W. McQuaid and F. E. Pavlis. *Iron and Steel Engineer,* v. 25, April 1948, p. 41-46; discussion, p. 46-48.

The need for oxygen generators at the site, capable of producing required quantities at low cost; concerning available commercial equipment of Air Products, Inc., Allentown, Pa. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 23, 1947.)

2b-102. The Duplex Process. D. T. Rogers. *Iron and Steel Engineer,* v. 25, April 1948, p. 49-57; discussion, p. 57-58.

For the purpose of this discussion, the term duplex refers specifically to the acid bessemer-basic openhearth combination which is the only duplex process of commercial significance in the U.S. today. Background, distinctive characteristics, metallurgical features, and advantages. 11 ref. (Presented at A.I.S.E. Detroit District Section Meeting, March 11, 1947.)

2b-103. Radioactive Tracers in Steelmaking. *Iron Age,* v. 161, April 29, 1948, p. 85.

Use of radioactive sulphur to prove that low pyritic and low organic coals are equally good for the production of steelmaking coke.

2b-104. Steel—How Made and How Much. *Westinghouse Engineer,* v. 8, May 1948, p. 66-72.

For laymen.

2b-105. The Application of Oxygen in the Operation of the Blast Furnace. D. D. Howat. *Blast Furnace and Steel Plant,* v. 36, May 1948, p. 533-538, 592, 602-603.

An investigation to determine benefits accruing from the utilization of an enriched blast and to decide limitations of the process. 11 ref.

2b-106. Practices Affecting Yields and Surface Quality of Rimmed and Semirimmed Steel. Leo R. Silliman, *Blast Furnace and Steel Plant,* v. 36, May 1948, p. 550-554.

Data from actual production records to indicate how economies may be obtained by control of certain tangible and fundamental production variables.

2b-107. Oxygen Enrichment—Its Effect on Openhearths. J. S. Marsh. *Steel,* v. 122, May 3, 1948, p. 112, 115, 118, 120, 122, 125.

A condensation. See abstract of "Combustion Oxygen in the Openhearth", *Iron Age,* v. 161, March 25, 1948, p. 87-89. See item 2b-65, 1948.

2b-108. Note on Further Work on the Phosphorus Reaction in Basic Steelmaking. P. Vajragupta. *Journal of the Iron and Steel Institute,* v. 158, April 1948, p. 494-496.

Range of two previous papers did not quite cover the more basic tapping slags, hence further work was done using two types of slags having high lime-silica ratios.

2b-109. Smelting Under Pressure. Leonard Engel. *Scientific American,* v. 178, May 1948, p. 54-57.

New technique being evaluated by Republic Steel at Cleveland and Youngstown. What takes place in the blast furnace, and how use of pressure can result in a large increase in iron and steel production without corresponding increase in production facilities.

2b-110. Production Flow Charts. Part 4. Electric Furnace Steel, Republic Steel Corporation, South Chicago, Ill. *Factory Management and Maintenance,* v. 106, May 1948, insert between p. 96 and 97.

2b-111. British Experimental Blast Furnace. Tom Bishop. *Metal Progress,* v. 53, May 1948, p. 693.

Furnace and the experimental program planned and under way, which includes effects of oxygen in the blast.

2b-112. Das Aplicacoes co Forno Eléctrico de Inducao a Baixa Frequência na Fundicao do Ferro. (Application of Electric Low-Frequency Induction of Furnace for Iron Smelting.) Hildebrando Américo Werneck. *Boletim da Associacao Brasileira de Metais,* v. 4, Jan. 1948, p. 5-28.

The above is studied with particular respect to Brazilian conditions and to three principal factors: energy consumption, cost of production, and a duplex method using a cupola furnace in combination with a low-frequency induction furnace.

2b-113. Sobre o Desenvolvimento da Sinterizacao e o Emprego de Minérios de Ferro Sinterizados na Suécia. (Development of Sintering and Utilization of Sintered Iron Ores in Sweden.) Erik Brauns. *Boletim da Associacao Brasileira de Metais,* v. 4. Jan. 1948, p. 29-35.

2b-114. Progress in High Pressure Operations of Blast Furnaces. B. S. Old, E. L. Pepper, and E. R. Poor. *Iron and Steel Engineer,* v. 25, May 1948, p. 37-43; discussion, p. 43-47.

Experience obtained from operation of two blast furnaces under high top pressure has resulted in the development of a number of mechanical improvements which have reduced delays to a point equivalent to that on a normal-pressure furnace. (Presented at A.I.S.E. annual convention, Pittsburgh, Sept. 25, 1947.)

2b-115. Agitation of the Bath With Compressed Air in the Liquid Metal Process. Oscar Pearson. *Iron and Steel Engineer,* v. 25, May 1948, p. 59.

2b-116. Use of Oxygen and Compressed Air in the Openhearth. M. F. Yarotsky. *Iron and Steel Engineer,* v. 25, May 1948, p. 59.

2b-117. Les Premiers Resultats de l'Emploi de l'Oxygene dans les Acieries. (The Primary Results of the Use of Oxygen in Steelmaking Furnaces.) Frank Kerry. *Revue de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 278-285.

Results of a series of studies in Canada and the U. S. on the use of oxygen in openhearth furnaces.

2b-118. Zur Kenntnis der Reduktion von Eisenoxyden mit Wasserstoff und Kohlenmonoxyd. (Reduction of Iron Oxides by Means of Hydrogen and Carbon Monoxide.) (Concluded.) H. J. Leibu. *Schweizer Archiv fur angewandte Wissenschaft und Technik,* v. 14, March 1948, p. 76-85.

The effect of magnesium, silicon, aluminum, and calcium oxides on the reduction of a certain German ore.

2b-119. Manufacture of Sponge Iron in Ceramic Tunnel Kilns. V. H. Gottschalk. E. S. Beebe, and Richard S. Cole. *Bureau of Mines, Report of Investigations* No. 4271, April 1948, 25 pages.

Sponge iron manufactured at oldest plant in Hoeganaes, Sweden, is most satisfactory. Experimental study of process including cost analysis.

2b-120. Mold Consumption; The Influence of Mold-Weight to Ingot-Weight Ratio. N. H. Bacon. *Iron and Steel,* v. 21, May 13, 1948, p. 251-255, Discussion p. 275-276.

Data from three sources. Data on octagon molds and molds with superimposed feeder heads.

2b-121. Ingot Surface Defects; "Double Skin" or "Curtaining" on Top-Poured Mild-Steel Ingots. P. Walker. *Iron and Steel*, v. 21, May 13, 1948, p. 256-257; Discussion, p. 275-276.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 96-98. See item 2b-35, 1948.

2b-122. Blast Variations Seriously Affect Cupola Operations. B. P. Mulcahy. *American Foundryman,* v. 13, June 1948, p. 34-42.

Importance of factor and recommended design procedures, including proper installation of air meters. Effects of various factors on the amounts of air required.

2b-123. Steelmaking in Acid Side-Blown Converters. Norman F. Dufty. *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 683-690, 751.

Practice at British works, and a theory of reactions involved. 10 ref.

2b-124. Practices Affecting Yields and Surface Quality of Rimmed and Semi-killed Steel. Part II. Leo R. Silliman. *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 691-694.

Relationship of pouring temperatures to semifinished yield; ingot-top condition and washed surface to semifinished yields; and ingot delivery time to yield loss due to slag pipe. (Concluded.)

2b-125. The Use of Blown Metal in Openhearth Steelmaking. H. B. Emerick. *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 695-696.

All-liquid-charge duplex process operated with acid converters and tilting basic openhearths. In this process, some portion of the charge, usually between 30 and 70%, is desiliconized blown-metal of variable carbon content; the remainder of the charge comprises liquid iron and scrap, or scrap alone.

2b-126. Effect of Coke Quality on Blast Furnace Iron Tonnage. E. J.

Gardner. *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 707-711.

A definite change in coking quality of high or low-volatile coal used in the blend produces a definite change in physical and chemical properties of resulting coke.

2b-127. Oxygen, Hydrogen and Sulphur in Steelmaking. Frank G. Norris. *Industrial Heating,* v. 15, June 1948, p. 988, 990, 992, 994.

Reviews several papers presented at recent A.I.M.E. meeting.

2b-128. Use of Oxygen for Decarburization and Melting in Electric Furnaces. J. H. Eisaman. *American Iron and Steel Institute, Preprint,* 1948, 10 pages.

Use of oxygen in stainless steel, alloy steels, single-slag alloys, and single-slag carbon-steel manufacture.

2b-129. A Vasao Metalica Do Cubilo. (Melting Rate of Cupola Furnaces.) Fabio Decourt Homem de Melo. *Boletim da Associacao Brasileira de Metais,* v. 4, April 1948, p. 173-176.

A formula for calculation of melting rate based on various operating factors. Data obtained agree quite satisfactorily with those of experimental investigation.

2b-130. Estudo de Duas Corridas de Aco Em Fornos Siemens Martin Basico. (Study of Two Melts of Steel in the Siemens-Martin Basic Furnace.) David Leon Schwartsman and Horacio J. Ceccantini. *Boletim da Associacao Brasileira de Metais,* v. 4, April 1948, p. 211-236.

Results of experimental work performed by a group of college students. Conditions necessary for oxidation of C, Si, Mn, P, and S were established for four types of slags.

2b-131. Kinetics of the Transfer of Sulpur Across a Slag-Metal Interface. Lo-Ching Chang and Kenneth M. Goldman. *Metals Technology,* v. 15, June 1948, T.P. 2367, 19 pages.

Ways in which such studies will lead to fruitful results from both the practical and theoretical standpoints.

2b-132. Direct Oxidation in the Basic Open Hearth Process. Edward B. Hughes and Frank G. Norris. *Metals Technology,* v. 15, June, 1948, T.P. 2380, 17 pages.

Two series of heats were studied with special attention to refining practice. The rates of carbon elimination for ore and direct oxidation were accurately determined. New method for determining the efficiency of carbon elimination. 16 ref.

2b-133. Low-Grade Ores; The Krupp-Renn Plant at Salzgitter. *Iron and Steel,* v. 21, June 1948, p. 285-287. Condensed from F.I.A.T. Report No. 727 by W. M. Pollitzer.

Krupp-Renn method, a roasting reduction process by which a product with 95% Fe is manufactured in a rotary kiln.

2b-134. Russian Steel-Making Research; Recent Work on Air-Oxygen Mixtures. *Chemical Age,* v. 58, June 5, 1948, p. 785-786.

2b-135. Gas for Steel Making. Arthur Q. Smith. *Industrial Gas,* v. 26, June 1948, p. 5-7, 29.

Use by Atlantic Steel Co., Atlanta, Ga.

2b-136. Desulphurisation and Dephosphorisation of Molten Cupola Iron and Pig-Iron in Basic-Lined Ladles; Report by Sub-Committee T.S. 10 of the Technical Council. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B14-B21; discussion, p. B21-B40.

Experiences using soda ash in ladle treatment. Types of dolomite linings and results obtained in service trials.

2b-137. Utilizing Cupola Metal in Open Hearth Charge. A. W. Gregg. *Steel,* v. 123, July 19, 1948, p. 116, 118, 121.

Operating technique enabling cupola operation for 72 to 100 hr. without dropping bottom, now being used in several steel plants.

2b-138. The Modern Open Hearth. T. J. Ess. *Iron and Steel Engineer,* v. 25, July 1948, p. O19-O70.

A manual on the subject. Steel capacity and production for various years since 1875; A.I.S.I. and S.A.E. designations for different compositions; diagrams and descriptions of typical openhearths, including details of materials of construction and dimensions of parts; properties of the refractories used; plant layout and buildings; instruments and controls; fuels, oil-burner design, and raw materials. Type of charges; charging and melting; the process itself; working and finishing the heat; tapping, pouring, molds, solidification of ingots; slags, yields, production rates; use of oxygen; fuel consumption, heat balances; the acid process; and services (electricity, water, and steam) required. Appendix tabulates steel companies of the U. S., giving number of furnaces, type, and capacity. 44 ref.

2b-139. O.H. + O_2 = ? D. E. Carb. *Blast Furnace and Steel Plant,* v. 36, July 1948, p. 801-805.

Use of oxygen in the openhearth process and economics of high-pressure charging.

2b-140. Seventy-Five Years of Progress in Iron and Steel; Coke, Pig Iron and Ingot Manufacture. C. K. King. *Seventy-Five Years of Progress in the Mineral Industry, 1871-1946* (American Institute of Mining and Metallurgical Engineers), 1947, p. 162-198. A condensation. (Full text to be published in book form.)

2b-141. Trends in Pig-Iron Manufacture. T. P. Colclough and I. S. Scott-Maxwell. *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 186-192.

Technical and economic trends in Britain.

2b-142. Economics of Ferrous Smelting. P. E. Cavanagh. *Canadian Metals & Metallurgical Industries,* v. 11, July 1948, p. 20-23, 37, 42.

Summary of a comprehensive study of various processes by the Ontario Research Foundation for the Ontario Research Commission. The main objects were to discover whether any known processes would be particularly suited to present and future Canadian conditions, and whether any new process would be of assistance in solving the scrap shortage in Canada. 28 ref.

2b-143. Use of Multiple Burners and Compressed Air to Improve Operating Rates of Open Hearth Furnaces. V. F. Corsini. *Industrial Heating,* v. 15, July 1948, p. 1174, 1176. A condensation.

Results of above. The net effect of a full year's experience was an increase in production rate of 15% over the best previous years and a 4.0% reduction in melting fuel.

2b-144. Effect of Sinter on Blast Furnace Practice. *Iron Age,* v. 162, July 29, 1948, p. 88-89. Condensed from paper by J. L. Mauthe.

Previously abstracted from original paper, *Blast Furnace and Steel Plant,* v. 36, July 1948, p. 817-824. See item 2a-9, 1948.

2b-145. The Application of Oxygen Enrichment to Side-Blown-Converter Practice. J. L. Harrison, W. C. Newell and A. Hartley. *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 281-290.

The practical utility of oxygen-enriched air for side-blown converter practice is demonstrated in a series of works-scale experiments; the higher thermal efficiency arising from oxygen enrichment is evaluated in terms of the various alternative factors such as shorter blowing time, higher steel temperature, and reduction in silicon and other fuel consumption. Detailed observations made during these trials compare the temperature increments and changes in chemical composition during the blow, with normal practice, and it is shown that with regard to the total of oxygen passed into the converter the combustion process is more efficient with oxygen-enriched air. It is also shown that the wear upon the refractories of the converter lining is not increased by the oxygen enrichment. 15 ref.

2b-146. Economic Advantages Offered by Side-Blow Converters. A. W. Gregg. *Steel,* v. 123, Aug. 23, 1948, p. 98, 100, 103-104.

Much less power consumption per ton of steel produced, less danger of over blowing and production of hotter metal for a given composition of the charge.

2b-147. Electric Furnace Oxygen Utilization. J. H. Eisaman. *Steel,* v. 123, Aug. 16, 1948, p. 112, 115-116, 118, 121-122.

Use of oxygen to afford greater stainless scrap charge, reduce heat time and improve chromium recovery. Advantages of using O_2 in stainless manufacture.

2b-148. Electrolytic Manganese in Open-Hearth and Bessemer Steel Tests at Jones & Laughlin Steel Corp., Pittsburgh, Pa. Frederick Sillers, Jr. *Bureau of Mines, Report of Investigations* No. 4303, July 1948, 33 pages.

Results of tests on application of electrolytic manganese to S.A.E. 1035 steels made in experimental openhearth furnace; the manufacture of laboratory and mill heats of low-carbon rimming strip steel; the manufacture of full-scale production heats of low-carbon (0.03-0.05% C) killed steels, and the manufacture of two grades of bessemer screw steel, A.I.S.I. B-1112 and A.I.S.I. B-1113.

2b-149. Production of Sponge Iron: Gaseous Reduction of Iron Oxide Glomerules in a Shaft Furnace. Edward P. Barrett and Carl E. Wood. *Bureau of Mines, Report of Investigations* No. 4305, July 1948, 19 pages.

Shaft-furnace process and its possible use in connection with experimental plant for the gasification of lignite. Procedure for making tests with the loss-in-weight apparatus.

2b-150. Oxygen Enriched Air for Steel Production. *Engineer,* v. 186, July 30, 1948, p. 103-105.

Theory, refractory linings, effect on output, quality of product, effect on refractories, fuel, raw material and other economic factors.

2b-151. Steel Casting-Pit Practice and Ingot Defects. R. N. Duncan. *Engineering,* v. 166, July 30, 1948, p. 117-118.

Practical discussion. Ladle, ingot mold, teeming speed and teeming, and stripping. Suggestions for reducing moisture and other causes for defects.

2b-152. Open Hearth Furnace Models. A. R. Philip. *Nature,* v. 162, July 31, 1948, p. 188.

Refers to a description of the use of aluminum powder for flow visualization in a water model of an openhearth furnace (March 27 issue). It was since found that part of the pattern was caused by air bubbles. Introduction of a stream of gas into the water ahead of the checkers resulted in immediate improvement.

2b-153. New Methods of Ladle Desulphurising Pig Iron. W. C. Newell, A. J. Langner, J. W. Parsons. *Foundry Trade Journal,* v. 85, Aug. 19, 1948, p. 165-169; discussion, p. 170-172.

Interim report prepared by the Steel Castings Division of the British Iron & Steel Research Association for its Melting Sub-Committee upon its recent theoretical and practical investigation of new and improved methods of desulphurizing remelted iron. Factors examined include slag basicity, various chemically reducing conditions, agitation by gas bubbling, and addition of specific sulphur retaining elements such as barium.

2b-154. The Application of Oxygen Enrichment to Side-Blown Converter Practice. J. L. Harrison, W. C. Newell, and A. Hartley. *Foundry Trade Journal,* v. 85, Aug. 19, 1948, p. 173-175. A condensation.

Results of several months' continuous operations with oxygen-enriched heats, which indicate that even a moderate degree of oxygen enrichment, applied with little or no modification to existing converter units, can lead to an improvemen in steelmaking practice. A series of technical advantages.

2b-155. New Process Promises Cheaper Steel. *Engineering News-Record,* v. 141, Aug. 26, 1948, p. 1.

Application of continuous casting to steelmaking as a short-cut procedure for obtaining semi-finished shapes.

2b-156. Oxygen in Side-Blown Converters. Max E. Davies. *Iron Age,* v. 162, Sept. 2, 1948, p. 87-91.

Use of oxygen in the side-blown converter by a British firm which has incorporated the technique as a production measure in its steelmaking practice. Results obtained on some 200 casts, utilizing 30 to 40% oxygen-enriched blast; effects on production rate, steel quality and refractory life. Cost data.

2b-157. Sulla possibilita di esistenza dello strato emulsionata metallo-scoria nella fabbricazione dell 'acciaio. (Concerning the Possibility of the Existence of a Metal-Scale Surface Layer During Production of Steel.) Raffaello Zoja. *La Metallurgia Italiana,* v. 40, Jan-Feb. 1948, p. 13-18.

Different opinions are reviewed. The possibility of the existence of such a layer was experimentally demonstrated.

2b-158. Oxygen in Iron and Steel Making. *Metallurgia,* v. 38, Aug. 1948, p. 188.

Recent developments.

2b-159. The Application of Oxygen-Enrichment to Side-Blown Converter Practice. J. L. Harrison, W. C. Newell, and A. Hartley. *Metallurgia,* v. 38, Aug. 1948, p. 193-200.

Condensed version previously abstracted from *Foundry Trade Journal,* v. 85, Aug. 19, 1948, p. 173-175. See item 2b-154, 1948.

2b-160. Blast Furnace Metal. E. F. Brown. *Iron and Steel,* v. 21, Aug. 1948, p. 367-371.

Experimental methods adopted and the data obtained on the desiliconization of blast-furnace metal by the addition of mill scale to the metal in the runner during casting.

2b-161. Development of an Improved Basic Bessemer Steel. H. A. Dickie. *Journal of the Iron and Steel Institute,* v. 159, Aug. 1948, p. 360-375.

The causes of the greater susceptibility of bessemer steel to work-hardening and strainage embrittlement, compared with openhearth steel. Methods of removing these causes. The principles of avoiding nitrogen absorption from the air blast and the development of low-phosphorus, low-nitrogen, basic bessemer rimming, and controlled-rimming steels. 21 ref.

2b-162. Use of Oxygen for Decarburization and Melting in Electric Furnaces. J. H. Eisaman. *Blast Furnace and Steel Plant,* v. 36, Sept. 1948, p. 1081-1084.

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1948. See item 2b-128, 1948.

2b-163. Method Devised for Casting Steel From Liquid Phase to Semi-Finished Shape. *Blast Furnace and*

Steel Plant, v. 36, Sept. 1948, p. 1105-1106.

Joint development of Republic Steel Corp. and Babcock & Wilcox Tube Co. Results are said to open up possibilities of utmost importance to the entire steel industry through increasing productivity and decentralizing production by simplification of apparatus and increasing the final yield of steel from the original melt. The process permits passing directly from the melt to semifinished sections ready for the secondary mills.

2b-164. Continuous Casting of Semi-Finished Steel at Babcock & Wilcox Beaver Falls Plant. *Industrial Heating,* v. 15, Sept. 1948, p. 1478-1482, 1484, 1498.

Equipment for the above, developed jointly by B. & W. and Republic Steel, in use for production of billets directly from molten steel since March 1948.

2b-165. "Submarine" Ladles Move Molten Iron at Jones & Laughlin Plant. *Industrial Heating,* v. 15, Sept 1948, p. 1500, 1502, 1504.

200-ton mixer-type ladle cars, the metal containers of which are shaped like submarines.

2b-166. Production of Large Steel Ingots. Francis B. Foley. *Industrial Heating,* v. 15, Sept, 1948, p. 1530, 1532, 1538.

Difficulties encountered in pouring large ingots, and various means of overcoming them; prevention of splash in pouring a multiple-heat ingot; mechanical requirements governing the pouring; chill ratio control between ingot and mold; chill ratios from top to bottom of the ingot; and control of ingot pipe and segregation.

2b-167. Operation of Oxygen-Enriched Open-Hearth Furnaces. J. S. Marsh. *Metals Technology,* v. 15, Aug. 1948, T.P. 2146, 12 pages; discussion, T.P. 2448, p. 18-20.

Results of 400 heats using five different furnaces. Enrichment to 27% O_2 resulted in maximum rate of production. Production increases of 20 to 50% were obtained with fuel savings of 10 to 25%, for specially supervised tests.

2b-168. Blast Furnace Metal; Desiliconization by Means of Mill Scale. (Concluded.) E. F. Brown. *Iron and Steel,* v. 21, Sept. 1948, p. 409-410.

Metallurgical observations and American work on the process. Mill scale is added to the runner during casting from the blast furnace.

2b-169. The Effect of Titanium on Nitrogen in Steel. George F. Comstock. *Metal Progress,* v. 54, Sept. 1948, p. 319-322.

First, reviews briefly previous knowledge; then presents experimental data which show that titanium has a readily observable effect on the nitrogen in ordinary steel, even when added in much smaller amounts than those used by Zapffe and Sims or Waber and McDonald. Relative action with aluminum and other grain refiners in plain-carbon steels; and precautions to be taken when adding considerably higher quantities of Ti in the high-Cr stainless steels.

2b-170. Sur l'amélioration des valeurs de la résilience des alliages ferritiques a 25% de chrome par la méthode de fusion sous vide. (Improvement of Impact Strengths of Ferrous Alloys Containing 25% Chromium by Vacuum Remelting.) Joseph Hochmann. *Comptes Rendus,* v. 226, June 28, 1948, p. 2150-2151.

Remelting under vacuum produced marked decarburization, deoxidation, and removal of nitrogen, resulting in large increase in impact strength.

2b-171. Producao em Forno Elétrico Basico e Propriedades do Aco Manganes. (Production of Manganese Steel in Basic Electric Furnaces and Its Properties.) Joel Ramalho. *Boletim da Associacao Brasileira de Metais,* v. 4, July 1948, p. 293-299.

Emphasizes certain peculiarities. Results of an investigation of factors influencing product properties.

2b-172. Thermodynamics in the Decarburization of Steel With Mill Scale. W. A. Pennington. *American Society for Metals, Preprint* No. 38, 1948, 45 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 213-257; discussion, p. 257-258.

Experiments which indicate that the process consists of two chemical reactions involving gases. A technique for determining the effect of different variables based upon volume measurements of the gases collected. The method is unique in that good results for the average specimen are available continuously throughout a run. Among factors investigated were: total pressure of CO and CO_2, effect of inert gases, type of scale, composition of steel, temperature, thickness of steel, and catalysts.

2b-173. Single Slag Basic Electric Furnace Practice. W. R. Patterson and J. T. Evans, Jr. *Iron Age,* v. 162, Sept. 30, 1948, p. 54-59.

Method developed in setting up an empirical melting procedure. The four basic requirements that must

be satisfied before the carbon-oxygen reaction can take place. Quantitative data are also presented, indicating the influence of various factors on melting conditions.

2b-174. The Use of Multiple Burners and Compressed Air to Improve the Operating Rates on Open Hearth Furnaces. V. F. Corsini. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 99. A condensation.

Previously abstracted from *Industrial Heating,* v. 15, July 1948, p. 1174, 1176. See item 2b-143, 1948.

2b-175. Continuous Casting of Steel. *Fortune,* v. 38, Oct. 1948, p. 16.

"Portentous new process" developed by Republic Steel and Babcock & Wilcox.

2b-176. The Chemical News Parade; Continuous Casting of Steel. *Chemical and Engineering News,* v. 26, Oct. 11, 1948, p. 3028-3029.

Picture story describes above process now in operation at the Beaver Falls, Pa., plant of Babcock & Wilcox Tube Co.

2b-177. Sull'esistenza di un punto critico nell' affinazione dell 'acciaio. (Existence of a Critical Point During the Refining of Steel.) Fausto Castagneri. *La Metallurgia Italiana,* v. 39, May-June 1947, p. 119-125.

Existence of a point of minimum oxidation in steel baths during refining is indicated by calculations based on theory and experiment. Relationships of this point to rate of heating, time required for melting, and temperature of the bath.

2b-178. Russian Experiments With Oxygen in Steel-Making. V. V. Kondakov. *Metallurgia,* v. 38, Sept. 1948, p. 302. Translated and condensed from *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), No. 10, 1946.

2b-179. Equilibrium Relationships in Systems Containing Iron Oxide and Their Bearing on the Problem of the Constitution of Liquid Open Hearth-Slags. P. Murray and J. White. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 9 pages.

Results which show that equilibrium relationships between slag and metal in the openhearth furnace can be represented by equilibrium constants of a mass-action form.

2b-180. The Physical Chemistry of Sulphur Removal in Steel Making. P. T. Carter. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 9 pages.

Experimental data to show relationships of reactions in sulphur distribution. The data also show that CaO, MgO, MnO, and FeO in the free state can desulphurize molten iron.

2b-181. The Behaviour of Oxygen in Liquid Steel During the Refining Period in the Basic Open-Hearth Furnace. S. Fornander. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 13 pages.

Results of studies on 36 experimental heats, made in different melting shops. A new method was developed for taking steel bath samples, suited for oxygen-content determinations.

2b-182. The Activity of Sulphur in Liquid Iron; The Influence of Carbon. J. A. Kitchener, J. O'M. Bockris, and A. Liberman. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 11 pages.

Thermodynamic treatment of experimental results on the interaction of sulphur with iron. Experimental procedures.

2b-183. The Reduction of Oxides of Iron as a Diffusion-Controlled Reaction. S. E. Woods. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 8 pages.

Different methods used in investigating gaseous reduction of iron ores. The reduction of hematitic ore is first considered, dealing in turn with reduction of a bed of the material by a gas flowing through it, with reduction of individual cubes of the ore, and with reduction of the sample contained in a boat. Special features of the reduction of magnetite.

2b-184. Tonnage Oxygen; Versatile Aid for Increasing Iron and Steel Output. Julius Strassburger. *Steel,* v. 123, Oct. 18, 1948, p. 148, 150, 153, 156, 158, 160, 163.

Recently published data on use of the above for blast and open-hearth furnaces and for bessemer converters. Experimental results obtained by Weirton Steel Co. Cost savings.

2b-185. Ferrous Metals Manufacture & Properties. S. L. Case. *Metals Review,* v. 21, Oct. 1948, p. 3, 5, 7, 9.

Highlights of noteworthy articles published during the past 12 months. References to A.S.M.'s "Review of Current Metal Literature".

2b-186. Elimination of Sulphur in the Blast Furnace. D. Joyce. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1207-1211, 1226-1227.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 291-296. See item 16b-72, 1948.

2b-187. Open Hearth Slag Control. George Teskey. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 98-101.

Use of "pancake" method at Bethlehem Pacific's South San Francisco plant.

2b-188. Application of Oxygen to Steel-Making. W. C. Newell. *Nature,* v. 162, Oct. 2, 1948, p. 518-519.

2b-189. Cupola Hot Metal for the Openhearth. E. S. Kopecki. *Iron Age,* v. 162, Oct. 21, 1948, p. 76-81.

In an attempt to minimize openhearth raw-material problems, four nonintegrated steel mills have resorted to the above practice. The success of these efforts is indicated by the cost and operating data presented for three of these plants. Construction details are also given of cupolas capable of operating continuously for up to 98 hr. between refractory repairs.

2b-190. Round Ingots Reduce Steelmaking Costs. *Iron Age,* v. 162, Oct. 21, 1948, p. 81.

Brief item cites report of German practice from *Iron and Coal Trades Review,* Aug. 6, 1948.

2b-191. Contributo allo studio de l'uso dell'aria arricchita di ossigeno nella fabbricazione della ghisa. (Contribution to the Study of the Use of Oxygen-Enriched Air in Cast-Iron Production.) Cornelio Ricci. *La Metallurgia Italiana,* v. 40, May-June 1948, p. 93-104

The diagrams of D. Castro, plotted on the basis of W. Mathesius' research, are analyzed. The analysis shows that the use of enriched air (26% by weight) decreases considerably the consumption of coke, at the same time increasing the rate of production and the quality of the product.

2b-192. Il proporzionamento della ghisa e del rottame nel forno Martin-Siemens. (Ratio of Cast Iron and Scrap in the Charge of an Openhearth Furnace.) Vittorio Gargiulo. *La Metallurgia Italiana,* v. 40, May-June 1948, p. 105-107.

Proposes use of a specially developed diagram.

2b-193. Contribution a la désulfuration dans le four a induction a H.F. (A Study of Desulfurization in a High-Frequency Induction Furnace.) H. Haemers. *Revue de Métallurgie,* v. 45, July 1948, p. 211-214; discussion, p. 214.

The problem of slag attack on furnace linings during desulfurization of steel by use of sodium carbonate, using various furnace designs and electrode systems.

2b-194. Réduction des minerais de fer par le gaz des hauts fourneaux. (Gaseous Reduction of Iron Ore in Blast Furnaces.) E. Herzog. *Revue de Métallurgie,* v. 45, July 1948, p. 215-230; discussion, p. 230.

The mechanism was studied, using the different low and medium-grade iron ores (21.5 to 46.0% Fe) available in France. Methods of investigation and apparatus used. Method adopted for determination of Fe in the ore and in the reduced sinter.

2b-195. Laramie Sponge-Iron Pilot Plant. T. L. Johnston and W. M. Mahan. *Bureau of Mines, Report of Investigations,* No. 4376, Sept. 1948, 45 pages.

The development and operation of pilot plant. Flow scheme and results of tests on various ores. The production of sponge iron in a large rotary kiln was investigated in individual tests.

2b-196. Statistical Methods in the Iron and Steel Industry. A. W. Swan. *Engineering,* v. 166, Oct. 15, 1948, p. 379-380. A condensation.

Problems involved in statistical study of steelworks operations, pointing out that the typical problem is of a highly complex character as compared with, for example, a machine-shop operation.

2b-197. Sampling Openhearth Slags at Varying Depths. *Iron Age,* v. 162, Nov. 11, 1948, p. 105.

Briefly describes this Russian device on the basis of an article in *Engineers' Digest* (American Edition), Sept. 1948.

2b-198. Advantages of Bessemer Steel in Producing Tubular Products. E. G. Price. *Steel,* v. 123, Nov. 15, 1948 p. 116, 119-120, 122, 124.

In an integrated plant, cost of making bessemer ingots over a period of years should be less than that of openhearth ingots. Also, during high scrap prices, the bessemer plant has a definite advantage.

2b-199. Kinetics of the Removal by Oxidation of Manganese, Silica, and Sulphur From Molten Iron. (In Russian.) A. M. Samarin and L. A. Shvartsman. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, May 1948, p. 565-574.

Rates with the slag phase absent. A simple first-order equation describes the kinetics of these processes.

2b-200. Influence of Silicic Acid on the Equilibrium of Liquid Iron With the Simplest Basic Slags. (In Russian.) O. Esin. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, May 1948, p. 617-623.

Experimental data for several liquid slag two-phase systems from the point of view of the theory of perfect ionic solutions proposed by Temkin. Theoretical and experimental data fully confirm this theory. 14 ref.

2b-201. Nodular Cast Irons. H. Morrogh and J. Grant. *Canadian Metals & Metallurgical Industries,* v. 11, Nov. 1948, p. 18-22, 32. A condensation. Reprinted from *Metallurgia,* v. 38, July 1948, p. 153-160.

2b-202. Ingot Structures in a Series From Rimmed to Killed Steels Made From the Same Cast. P. M. Macnair. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 151-163.

A series of ten ingots, ranging from box-hat, through rimming, and rising to killed steel, was made from the same cast by additions of iron oxide and aluminum to the molds. Vertical cross sections through the center-line were prepared and the ingots examined for blowhole appearance and chemical segregation of the major elements, carbon, sulphur, phosphorus, and manganese. A theory is advanced to explain the method of formation of the various types from wild to killed steel.

2b-203. Ingot Surface Defects in Structural Steels. L. Reeve. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 169-176.

Causes are considered, the controlling factors being divided between those acting in the furnace and those acting outside the furnace. Results of a detailed statistical analysis of the causes of defects in steel produced from 19,600 tons of 85-cwt. ingots of "balanced" quality carbon steel used for the production of steel joists.

2b-204. The Effect of Operating Conditions on Type of Reduction and Carbon Rates in the Blast Furnace. John Taylor. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 137-176.

Calculation methods as applied to different types of ore. 14 ref.

2b-205. The Application of Statistical Methods to the Study of Ingot Cracking. I. M. MacKenzie and T. Urie. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 177-196.

2b-206. A Note on the Effects of Lime Additions to Iron Ore Sinters. J. M. McLeod. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 197-204.

Since it is believed that the poor reducibility of sinter is at least partly due to the particles of iron oxide being coated with ferrous silicate slag having little or no porosity, lime was added to cause the formation of calcium silicate instead of ferrous silicate. Results obtained were quite satisfactory, the sinters with the higher melting calcium silicate slag having a much higher rate of reducibility.

2b-207. Critical Analysis of the Work of Marshall and Chipman on the Problem of the Activity of Carbon and Oxygen in Liquid Steels. (In Russian.) B. V. Stark. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 655-672.

Concludes that the experimental data of Marshall and Chipman obtained at 1540° C. concerning the carbon content in liquid steel above 1% are not sufficiently reliable. Therefore, their assumption concerning the change of activity of carbon and oxygen at an increased concentration of one of them cannot be considered valid. 6 ref.

2b-208. Note on the Distribution of Sulphur Between Molten Iron and Slag. Terkel Rosenqvist. *Metals Technology,* v. 15, Oct. 1948, T.N. 7, 2 pages.

Theory of the above. Believes that the diatomic molecules FeS and MnS do not exist in molten steel but that atoms and ions of sulphur and of oxygen are in equilibrium.

2b-209. The Role of Thermochemical Factors in Basic Open Hearth Production Rate. T. E. Brower and B. M. Larsen. *Metals Technology,* v. 15, Oct. 1948, T.P. 2451, 16 pages.

Variables which affect the net heat that must be put into the bath in order to make a heat of steel from any given set of charge materials. Heat-balance calculations; relation between proportion of hot metal or cold pig and net heat requirements; relative oxidation by air or by ore; production rate with light or heavy scrap; relation between extra feed ore and carbon at melt and production rate; effect of oxygen blowing on net heat requirement; production rate vs. charged limestone; possibilities of controlling or increasing production rate; and net heat requirement from charge to melt.

2b-210. Some Correlations Between Variables Affecting Sulphur in Blast Furnace Iron. T. E. Brower and B. M. Larsen. *Metals Technology,* v. 15, Oct. 1948, T.P. 2465, 13 pages.

Theoretical analysis based on statistical manipulation and evaluation of operating data from several commercial blast furnaces which include rather wide variations in practice. Concerned mainly with the effect of Mn on S elimination, but also includes certain other variables such as silicon in iron and slag basicity.

2b-211. New Methods of Ladle De-Sulphurising Pig Iron. (Concluded.) W. G. Newell, A. J. Langner, and J. W. Parsons. *Engineering*, v. 166, Oct. 29, 1948, p. 431-432.

Previously abstracted from *Foundry Trade Journal*, v. 85, Aug. 19, 1948, p. 165-169. See item 2b-153, 1948.

2b-212. The Acid Bessemer Process in the Manufacture of Pipe. E. G. Price. *Blast Furnace and Steel Plant*, v. 36, Nov. 1948, p. 1337-1342.

The bottom-blown acid bessemer process in its relationship to the production of tubular products. Much of the information is also applicable to basic and side-blown converters.

2b-213. Pressure Blast Furnaces Show Greater Production, No Special Maintenance Problems. *Blast Furnace and Steel Plant*, v. 36, Nov. 1948, p. 1371.

Operating results for two blast furnaces.

2b-214. The Production of Sound Steel Ingots. *Industrial Heating*, v. 15, Nov. 1948, p. 1936, 1938. Condensed from paper by Robert L. Stephenson.

Difficulties involved and an evaluation of the effects of some factors involved.

2b-215. Melting Stainless Steel in an Induction Furnace. Gordon L. Meeter. *Foundry*, v. 76, Dec. 1948, p. 97, 249.

Story of the evolution of one company's method of melting, including use of scrap metal. How analytical results and their mathematical analysis, plus close observation, made it possible to develop optimum melting practice.

2b-216. A Spark in Steel. *Fortune*, v. 38, Dec. 1948, p. 94-101, 174, 176, 179-182, 184, 186-188.

Use of pressure in the blast furnace. Diagrams show the evolution of the blast-furnace process over the past 100 years. Other actual or proposed developments, such as direct reduction, sponge iron, use of oxygen.

2b-217. Softening Temperatures of Iron Ores and Agglomerates. (In Russian.) L. M. Tsylev. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 889-898.

Studies in the blast-furnace process, including effect on slag formation. The influence of different types of ore and of slag composition on this phenomenon.

2b-218. Wrought Iron Has Two Components. *Industry and Power*, v. 55, Dec. 1948, p. 88-89, 114.

Chief characteristics and two present-day methods of producing wrought iron.

2b-219. Determination of Gases in Molten Steel From the Progress of Fusion. (In Russian.) V. T. Braga. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1052-1057.

Proposes three variations based on work published in 1947 in *Zavodskaya Laboratoriya*. This method of determination is said to open new possibilities for melt control.

2b-220. Steel-Making by Electric Arc Furnace Process. T. V. Simpkinson. *Canadian Metals & Metallurgical Industries*, v. 11, Nov. 1948, p. 14-17, 30. Reprinted from *Canadian Mining and Metallurgical Bulletin*, March 1948.

2b-221. The Thermodynamics of Substances of Interest in Iron and Steel Making From 0° C. to 2400° C. I. Oxides. F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute*, v. 160, Nov. 1948, p. 261-270.

Available thermal data. Free energies of formation are calculated for temperatures up to 2000° C. and the results plotted on a free-energy/temperature diagram. Equations are given for each oxide, and limits of accuracy are proposed. Advantages of graphical representation of the results and its value for explaining complex processes and equilibria. How these and other problems can be solved by use of a special transparent grid superposed on the diagram. 63 ref.

2b-222. The Influence of Teeming Times on Ingot Surface Defects. W. E. Goodrich. *Journal of the Iron and Steel Institute*, v. 160, Nov. 1948, p. 295-302.

Data accumulated during long-period observations made at various stages of rolling and forging operations on steel ingots. Application of the information in establishment of ideal ingot-teeming times. Variations in steel composition and quality, mold design and dimensions, and ladle-nozzle sizes. Optimum teeming times for a variety of steels and mold sizes.

2b-223. Oxygen Enrichment; Application to Side-Blown Converter Practice. J. L. Harrison, W. C. Newell, and A.

Hartley. *Iron and Steel*, v. 21, Nov. 18, 1948, p. 521-525; discussion, p. 589-590.

Previously abstracted from *Foundry Trade Journal*, v. 85, Aug. 19, 1948, p. 173-175. See item 2b-145, 1948.

2b-224. Basic Bessemer Steel; Development of an Improved Quality by Nitrogen Control. H. A. Dickie. *Iron and Steel*, v. 21, Nov. 18, 1948, p. 525-532; discussion, p. 590-591.

Previously abstracted from *Journal of the Iron and Steel Institute*, v. 159, Aug. 1948, p. 360-375. See item 2b-161.

2b-225. Structural Steels; Various Causes of Ingot Surface Defects. L. Reeve. *Iron and Steel*, v. 21, Nov. 18, 1948, p. 568-571; discussion, p. 592-593.

Previously abstracted from *Journal of the Iron and Steel Institute*, v. 160, Oct. 1948, p. 169-176. See item 2b-203, 1948.

2b-226. Ingot Structures; A Series from Rimmed to Killed Steels Made from the Same Cast. P. M. Macnair. *Iron and Steel*, v. 21, Nov. 18, 1948, p. 572-579; discussion, p. 592.

Previously abstracted from *Journal of the Iron and Steel Institute*, v. 160, Oct. 1948, p. 151-163. See item 2b-202, 1948.

2b-227. Electric Arc Steel Making. Part II. T. V. Simpkinson. *Canadian Metals & Metallurgical Industries*, v. 11, Dec. 1948, p. 14-17, 26-29.

The process of melting fully killed steel wherein, after suitable oxidation, the bath is deoxidized under a reducing slag. For the most part, melting of cold scrap charges is considered.

2b-228. The Austenitic Stainless Steels —American and British Practice Compared. F. H. Keating. *Metal Progress*, v. 54, Dec. 1948, p. 819-822.

Invites discussion as an aid to those in both countries who direct the manufacture and use of these materials. The principal points of difference in British and American practice concern the use of unstabilized compositions, the safe upper limit of carbon content in stabilized steels, and use of the Huey test for corrosion.

2b-229. The Blast-Furnace Process and Means of Control. T. L. Joseph. *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 167, Iron and Steel Division, 1946, p. 15-36.

Previously abstracted from *Metals Technology*, April 1946, T.P. 2021. See item 2-63, 1946.

2b-230. An Equilibrium Study of the Distribution of Phosphorus Between Liquid Iron and Basic Slags. Theodore B. Winkler and John Chipman. *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 167, Iron and Steel Division, 1946, p. 111-133.

Previously abstracted from *Metals Technology*, April 1946 T. P. 1987. 16 ref. See item 2-61, 1946.

2b-231. Sulphur Equilibria Between Liquid Iron and Slags. Nicholas J. Grant and John Chipman. *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 167, Iron and Steel Division, 1946, p. 134-149, discussion, p. 150-154.

Previously abstracted from *Metals Technology*, Apr. 1946. T. P. 1988. 30 ref. See item 9-62, 1946.

2b-232. The Low-Temperature Gaseous Reduction of Magnetite Ore to Sponge Iron. O. George Specht, Jr. and Carl A. Zapffe. *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 167, Iron and Steel Division, 1946, p. 237-277; discussion, p. 277-280.

Previously abstracted from *Metals Technology*, June 1946, T. P. 1960. 228 ref. See item 2-29, 1946.

2b-233. Production of Carbon and Alloy Steels by the Side Blown Converter Process. F. Cousans. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. A101-A105; discussion, p. A105-A107.

Previously abstracted from *Foundry Trade Journal*, v. 82, July 24, 1947, p. 275-280. See item 2-195, 1947. Also appeared as advance copy No. 878.

2b-234. Operation of the Iron Blast Furnace at High Pressure. J. H. Slater. *Yearbook of the American Iron and Steel Institute*, 1947, p. 125-198; discussion, p. 199-200.

Previously abstracted from *Blast Furnace and Steel Plant*, v. 35, Sept. 1947, p. 1083-1090; Oct. 1947, p. 1213-1218. (Presented at A.I.S.I. Meeting New York, May 21-22, 1947.) See items 2-234 and 2-254, 1947.

2b-235. The Use of Oxygen in the Open Hearth Practice for Carbon Reduction. George V. Slottman. *Yearbook of the American Iron and Steel Institute*, 1947, p. 234-262; discussion, p. 262-263.

Previously abstracted from preprint. (Presented at A.I.S.I. meeting New York, May 21-22, 1947.) See item 2-169, 1947.

2b-236. A Method of Estimating Blast Furnace Production and Coke Consumption. W. E. Marshall. *Yearbook of the American Iron and Steel Institute*, 1947, p. 379-404.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 2-120, 1947.

2b-237. Densita e viscosita delle scorie e del bagno metallico nel sistema Fe-W-Cr. (Density and Viscosity of Slags and Molten Metals for the System Fe-W-Cr.) L. Losana. *La Metallurgia Italiana,* v. 39, Jan-Feb. 1947, p. 5-11.

Results of determination for series of Cr, W, and Cr-W steels of widely varying composition. The densities of slags with different CaO-SiO_2 ratios and contents of WO_3 and Cr_2O_3 were also determined.

2b-238. Il concetto di "carica normale" nei forni d'acciaieria. (The Concept of the "Normal Charge" of Steel Furnaces.) L. Bruno. *La Metallurgia Italiana,* v. 39, Jan.-Feb. 1947, p. 24-29.

Different factors involved in steel production, emphasizing the fact that the proper relationship between the components of the charge, termed "normal charge", is of principal importance for quality of product and minimum cost of production.

2b-239. L'ossigeno nella fabbricazione della ghisa. (Use of Oxygen in the Production of Cast Iron.) Ettore De Castro. *La Metallurgia Italiana,* v. 39, July-Aug. 1947, p. 167-179.

Detailed calculations on the above.

2b-240. Distribuzione della segregazione in lingotti di acciaio diversamente proporzionati. (Distribution of Segregation in Steel Ingots of Different Proportions.) A. Bartocci *La Metallurgia Italiana,* v. 39, July-Aug. 1947, p. 184.

Cross-sectional photographs for three typical shapes.

2b-241. Specially Processed Silicon Carbide as a Deoxidizing Agent in the Reducing Slag for Basic Electric Steelmaking. E. A. Loria, H. D. Shephard, and A. P. Thompson. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 155-164; discussion, p. 165-166.

Previously abstracted from preprint. See item 2-80, 1947.

2b-242. Production of Carbon and Alloy Steels by the Side-Blown Converter Process. F. Cousans. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 34-38.

Previously abstracted from *Foundry Trade Journal,* v. 83, July 24, 1948. See item 2-195, 1947.

2b-243. Application of a Single Slag Process to Basic Electric Steel. M. V. Healey and R. W. Thomas. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 368-371; discussion, p. 372-374.

Process consists essentially of providing a boiling period of approximately one hour in order to reduce carbon content to 0.55 to 0.60% and to eliminate neutral and reducing gases, and then tapping the heat before the gases have an opportunity to return. It was concluded that the process is capable of producing steel of quality approaching that of the openhearth product for grain-growth characteristics. The reducing period is believed to serve no useful function in steelmaking except possible recovery of oxidizable alloys from the slag, and its elimination reduces costs. See item 2-72, 1947.

2b-244. Slag Control in the Acid Electric Furnace. H. H. Johnson, M. T. McDonough, and D. L. Radford. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 520-531; discussion, p. 531-532.

Previously abstracted from Preprint 47-19. See item 2b-45, 1948.

2b-245. Thermochemical Analysis of Combustion in a Cupola. H. Edward Flanders. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 533-543; discussion, p. 543-545.

Previously abstracted from Preprint 47-50. See item 16b-20, 1948.

2b-246. Factors Which Determine Iron and Steel Making Processes. H. W. Graham. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 15-26.

Previously abstracted from *Metals Technology,* v. 14, Aug. 1947, TP 2217. See item 2-232, 1947.

2b-247. The Rate of Reduction of Geneva Iron Ore. J. R. Lewis. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 27-41; discussion, p. 41-45.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2177. See item 2-136, 1947.

2b-248. Experimental Laboratory Study on Effect of Pressure on Carbon Deposition and Rate of Reduction of Iron Oxides in the Blast-Furnace Process. L. F. Marek, A. Bogrow, and G. W. King. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 46-69; discussion, p. 69-70.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2184. See item 2-138, 1947.

2b-249. German Iron Ores Yield Vanadium. R. P. Fischer. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 71-75; discussion, p. 75.

Previously abstracted from *Metals Technology,* v. 13, Sept. 1946, TP 2070. See item 1-56, 1946.

2b-250. Production of Low-Sulphur Sponge Iron. R. C. Buehl, E. P. Shoub, and J. P. Riott. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 76-85; discussion, p. 85-89.

Previously abstracted from *Metals Technology,* v. 13, Oct. 1946, TP 2093. See item 2-148, 1946.

2b-251. An Electrochemical Study of the Properties of Molten Slags of the System $CaO-SiO_2$ and $CaO-Al_2O_3-SiO_2$. Lo Ching Chang and G. Derge. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 90-116; discussion, p. 116-120.

Previously abstracted from *Metals Technology,* v. 13, Oct. 1946, TP 2101. See item 2-149, 1946.

2b-252. The Identification of CaO-MgO Orthosilicate Crystals, Including Merwinite ($3CaO.MgO.2SiO_2$), Through the Use of Etched Polished Sections. R. B. Snow. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 121-135; discussion, p. 135-136.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2167. See item 11-84, 1947.

2b-253. Oxygen in Liquid Open-Hearth Steel—Oxygen Content During the Refining Period. T. E. Brower and B. M. Larsen. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 137-151; discussion, p. 151-163.

Previously abstracted from *Metals Technology,* v. 13, Sept. 1946, TP 2035. See item 2-129, 1946.

2b-254. Oxygen in Liquid Open-Hearth Steel — Effect of Special Additions, Stirring Methods and Tapping. T. E. Brower and B. M. Larsen. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 164-174; discussion, p. 174-175.

Previously abstracted from *Metals Technology,* v. 13, Oct. 1946, TP 2076. See item 2-147, 1946.

2b-255. The Mechanism of the Carbon-Oxygen Reaction in Steelmaking. C. E. Sims. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 176-189; discussion, p. 189-195.

Previously abstracted from *Metals Technology,* v. 14, Jan. 1947, TP 2129. See item 2-16, 1947.

2b-256. Oxygen in Basic Electric-Furnace Baths. S. F. Urban and G. Derge. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 196-210; discussion, p. 210-211.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2185. See item 2-139, 1947.

2b-257. Some Questions on Interrelated Processes Going on in the Blast Furnace. B. M. Larsen. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 621-633; discussion, p. 633-657.

Previously abstracted from *Metals Technology,* v. 14, Feb. 1947, TP 2132. See item 2-41, 1947.

2c—Nonferrous

2c-1. The Mufulira Smelter, Northern Rhodesia. F. E. Buch. *Metals Technology,* v. 14, Dec. 1947, T.P. 2248, 13 pages.

Smelter is designed for production of 10,000 short tons of blister copper per month. Major units comprise two reverberatory furnaces; three 13x30-ft. Pierce-Smith converters; two straight-line casting machines, one served by a 13x30-ft. holding furnace and the other by a ladle-tilting quadrant; two converter aisle cranes; and two converter blowers. It treats a wet flotation concentrate containing approximately 53% Cu, 0.9% oxide copper. The necessity for eliminating bismuth.

2c-2. Roan Antelope Smelter, Northern Rhodesia. R. J. Stevens. *Metals Technology,* v. 14, Dec. 1947, T.P. 2249, 18 pages.

Several uncommon features of operation are: the high grade of concentrate treated (about 50% Cu); the high-flux burden on the charge, necessary because of deficiency of bases and high alumina content of the concentrate; the frequent necessity of adding coal to the furnace charge to control the matte grade; and the high grade of matte produced.

2c-3. Production of "Crown Special" Zinc. *Industrial Chemist and Chemical Manufacturer,* v. 23, Dec. 1947, p. 806-816.

The plant of the Imperial Smelting Corp. at Avonmouth, England. Fowsheet for the production of sulphuric acid, crude zinc oxide, cadmium, and zinc from zinc concentrate obtained from Australia.

2c-4. Electric Furnace Smelts Sullivan Tin Concentrate. John B. Huttl. *Engineering and Mining Journal,* v. 149, Jan. 1948, p. 60-62.

Procedures and equipment used by Consolidated Mining and Smelting Co. of Canada, Ltd.; flowsheets.

2c-5. The Inorganic Chemistry of Some Metallurgical Processes. A. J. E. Welch. *Annual Reports on the Progress of Chemistry,* v. 43, 1947, p. 129-137.

Recent developments in production of metals by chemical and electrochemical processes: extraction of magnesium (particularly from sea water); production of highly electropositive metals by thermal reduction processes; extraction of alumina and aluminum from clay; and the extrac-

tion chemistry of beryllium and zirconium.

2c-6. Smältanrikning av Mangan Fran Spegeljarn i Sulfid-Oxidslagg Genom Inblasning av Slaggbildarna. (Concentration of Manganese From Liquid Spiegeleisen in a Sulphide-Oxide Slag by Blowing the Slag Formers.) Helge Lofquist. *Jernkontorets Annaler,* v. 131, no. 11, 1947, p 493-517.

Manganese-rich equilibrium slags were produced more rapidly and effectively by blowing the slag-forming substances containing S and O_2 from the bottom into the molten alloys in order to increase the reaction interface. It was found most convenient to blow in pyrite concentrate with a controlled amount of air, whereby the remaining nitrogen protected the slag layer against oxidation. This method gave, with high yields of Mn and S, slags containing 60 to 65% Mn, 3 to 5% Fe, 3% SiO_2 and 16 to 18% S. A heat balance indicates that such a process could be carried out in a converter by means of its own heat of reaction. 13 ref.

2c-7. Nonferrous Metallurgists Report New Processes. Carle R. Hayward. *Engineering and Mining Journal,* v. 149, Feb. 1948, p. 114-117.

1947 developments with mention of continuous casting of copper-base alloys.

2c-8. Production of Rare Earth and Thorium Compounds from Monazite. Part I. E. S. Pilkington and A. W. Wylie. *Journal of the Society of Chemical Industry,* v. 66, Nov. 1947, p. 387-393.

A process for separation of rare-earth elements in monazite into cerium-group hydroxides containing thorium hydroxide and crude thorium oxalate. Quantitative aspects of the various methods used to accomplish the separations. 22 ref.

2c-9. Pilot-Plant Distillation and Purification of Titanium Tetrachloride. C. Kerby Stoddard and Emil Pietz. *Bureau of Mines, Report of Investigations* 4153, Dec. 1947, 40 p.

The pilot-plant production of ductile titanium by the modified Kroll process requires large amounts of pure $TiCl_4$. The usual commercial product is not pure enough. Details of laboratory and pilot-plant work on development of suitable processes. Both distillation and chemical purification are required. The most satisfactory purifying reagent is copper powder. Includes information on recommended design of, and materials for, commercial equipment; heat-balance data; and method of analysis for $SiCl_4$. 22 ref.

2c-10. Metallurgy of Lead. R. D. Bradford. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 96-97.

1947 developments in production methods.

2c-11. Zinc Smelting. Francis P. Sinn. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 97-98.

1947 developments.

2c-12. Silver; A Survey of Its Production, Properties and Engineering Uses. Part I—Extraction Methods. Part II—Refining and Fabrication. L. B. Hunt. *Metal Industry,* v. 72, Jan. 23, 1948, p. 63-66, Jan. 30, 1948, p. 83-87.

2c-13. Dezincing Lead Under Vacuum. *Compressed Air Magazine,* v. 53, Feb. 1948, p. 45.

Based on paper by W. T. Isabell, presented at March 1947 meeting of the A.I.M.E.

2c-14. The Control of Gas Content During the Melting of Phosphor Bronzes, Gun Metals and Leaded Bronzes. W. T. Pell-Walpole. *Metallurgia,* v. 37, Jan. 1948, p. 119-128.

Result of a detailed investigation on the effects of the CuO content of the flux and the amounts of gas and of phosphorus or zinc in the charge, on efficiency of degassing and on oxidation losses.

2c-15. Essais de Dégazage Sous Vide en Phase Solide des Métaux Autres que le fer Utilisés dans la Fabrication des Aciers Spéciaux, (Attempts to Degasify Solid Metals, Other Than Iron, Used in the Manufacture of Special Steels, by Evacuation.) J. Hochmann. *Revue de Métallurgie* v. 44, May-June 1947, p. 161-173.

Ni, Co, Al, FeSi, FeCr, FeMn, Fe_2N, Fe_4N, Mn_5N_2, and others were subjected to high temperatures under vacuum for degasification purposes. Results are tabulated.

2c-16. Copper Smelting; Plant and Operations at the Mufulira Smelter. F. E. Buch. *Metal Industry,* v. 72, Feb. 6, 1948, p. 107-108.

Previously abstracted from *Metals Technology,* v. 14, Dec. 1947, T.P. 2248. See item 2c-1, Feb. 1948.

2c-17. Gas Absorption Phenomena and Degasification of Cast Monel. Bernard N. Ames and Noah A. Kahn. *American Foundrymen's Assoc., Preprint No.* 47-45, 1947, 15 pages.

Studies the effect of various deoxidation treatments of cast Ni-Cu alloys melted in indirect and resistor furnaces. Magnesium is shown to be inadequate as a degasser. In the indirect arc furnace, titanium, lithium and zirconium deoxidation yielded satisfactory results. Detrimental effects of nitrogen and hydrogen

and use of Ti, Li, or Zr to prevent nitrogen porosity and of Ti to minimize hydrogen porosity. Comparative effects between the keel-block test bar and another test bar in reflecting metal quality.

2c-18. The Development and Introduction of a New Process for the Economic Recovery of Minute Quantities of Gold From Lead-Silver Bullion Derived From the Bawdwin Ores. Walter Frayne. *Bulletin of the Institution of Mining and Metallurgy,* Feb. 1948, p. 1-11.

Nanita smelting works of Burma Corp., Burma, produces Pb, Ag, Zn concentrates, Cu-Pb matte Ni-Co speiss, and refined antimonial Pb. Each product contained small percentages of Au which was not recovered. Gold-zincing was found to be uneconomic. Study of the Pb-Zn-Ag system led to development of a commercial process for recovery of gold based on the fact that the gold becomes concentrated in the Ag-Zn crust during the Parkes process, thus reducing the amount of material to be treated from 6000 to 250 tons per mo. Experimental data from laboratory and pliot-plant work and from the resulting commercial process. The results also indicate a method for enrichment of Parkes retort bullion on similar material with a sufficiently low Zn content which would not entail use of very high temperatures and, therefore, would require little in the way of special equipment.

2c-19. Determination of Calcium Vapor Pressure in the Thermal Production of Calcium Metal. L. M. Pidgeon and J. T. N. Atkinson. *Canadian Mining and Metallurgical Bulletin,* v. 41, Jan. 1948, p. 14-20.

The production of metallic calcium, by reduction of lime with aluminum, was investigated. Using a modified form of the effusion method, the vapor pressure of calcium above the reaction was determined and found to vary from 1.0 to 1.3 mm. Hg from 1150° to 1200° C. It is believed that the reaction consists of reduction of lime with aluminum vapor. 11 ref.

2c-20. Influence du Carbonate de Soude sur la Vitesse de Reduction d'une Blende Supergrillée par le Coke. (Effect of Sodium Carbonate on the Rate of Reduction of a Zinc Blende Exhaustively Roasted With Coke.) v. 44, July-Aug. 1947, p. 234-244.

Addition of Na_2CO_3 increased the rate of reduction markedly at temperatures below 1100° C. The rate and amount of reduction for a given time increase with the Na_2CO_3 content of the charge, contents of 0.10% by weight of the blende being most effective. The usual theoretical concepts concerning the mechanism of reduction of zinc oxide and the role of the Boudonard reaction are confirmed.

2c-21. Further Notes on Converter Practice at Rio Tinto. H. R. Potts. *Bulletin of the Institution of Mining and Metallurgy,* March 1948, p. 1-18.

Information was first given by the present author in a paper published in 1929. Because of the large number of changes since then, the operations are again described. Average composition of the matte is 22.88% Cu, 24.50% S, and 42.60% Fe. Redesign of wind boxes; reduction in thickness of magnetite layer used to protect the tuyere linings; fundamental reactions of converter operation; disposal of by-products; converter refractories; elimination of As and Bi; cleaning of converter mouths; and casting of copper. Operating data.

2c-22. Copper Refining. *Metal Industry,* v. 72, March 12, 1948, p. 203-205.

Plant, equipment, and procedures of Murex, Ltd., Rainham, Essex, England.

2c-23. Platinum Metals; A Survey of Their Production, Properties and Engineering Uses. Part I—Extraction, Melting and Working. Part II—Properties. Part III—Applications. Part IV—Alloys. C. A. H. Jahn. *Metal Industry,* v. 72, March 5, 1948, p. 183-186; March 12, 1948, p. 206-209; March 19, 1948, p. 228-230, 234; March 26, 1948, p. 249-250, 254; April 2, 1948, p. 267-269.

An illustrated survey. (Recently presented at meeting of Midland Metallurgical Societies.)

2c-24. Copper and Brass Production. J. Sykes. *Metal Industry,* v. 72, March 19, 1948, p. 223-226.

British plant for refining, casting, and rolling copper and brass.

2c-25. The Rarer Metals. *Metal Industry,* v. 72, March 26, 1948, p. 246-248.

Ore beneficiation; smelting; reduction, and refining; Thermit welding; and powder metallurgy. Metals treated include W, Mo, V, Ti, Mn, Cr, Co, Cb, Ta, Zr, and B.

2c-26. Production of Thorium, Zirconium and Uranium. George Meister. *Metal Progress,* v. 53, April 1948, p. 515-520.

The various methods of each.

2c-27. Trail Refuses to Trail in Chemical Pioneering. Sidney D. Kirkpatrick. *Chemical Engineering,* v. 55, April 1948, p. 96-99.

Many unique processes peculiarly applicable to local raw materials and facilities are described and il-

lustrated. Most notable include use of byproduct oxygen in contact sulphuric acid production; gasification of coal; and zinc and lead smelting. Other striking advances have been made in the technology and production of nitrogenous and phosphatic fertilizers.

2c-28. Production of Rarer Metals. George Meister. *U. S. Atomic Energy Commission, MDDC*-1673, Feb. 11, 1948, 11 pages.

Methods for thorium, zirconium, and uranium. Apparatus diagrams. Properties. See item 2c-26, 1948.

2c-29. Vacuum Melting and Casting of Copper. Robert A. Stauffer, Kenneth Fox, and William O. DiPietro. *Industrial and Engineering Chemistry,* v. 40, May, 1948, p. 820-825.

Previous laboratory investigations have suggested that porosity in copper ingots might be reduced by melting and casting in vacuum. Vacuum furnace constructed to conduct tests on 300-lb. melts of copper. Steps in preparing ingots include atmospheric preheating followed by vacuum melting, degassing, and casting. Results of experiments indicated that sound ingots may be produced, that impurities may be removed, and that some of the physical properties of copper can be improved by the process. 10 ref.

2c-30. The Metals of the Platinum Group. C. A. H. Jahn. *Metallurgia,* v. 37, April 1948, p. 307-310.

A condensation. See abstract of "Platinum Metals; A Survey of Their Production, Properties and Engineering Uses", *Metal Industry,* v. 72, March 5, 1948, p. 183-186; March 12, 1948, p. 206-209; March 19, 1948, p. 228-230, 234; March 26, 1948, p. 249-250, 254; April 2, 1948, p. 267-269. Item 2c-23, 1948.

2c-31. L'Analyse Thermodynamique du Systeme $2Cu+H_2O \rightleftharpoons Cu_2O+2H$. (Thermodynamic Analysis of the System $2Cu + H_2O \rightleftharpoons Cu_2O + 2H$.) M. H. Lepp. *Revue de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 271-277; discussion, p. 277.

Largely based on data from the literature. Absorption of hydrogen on copper; thermal dissociation of Cu_2O; thermal dissociation of water vapor; and the system $4\ Cu+ H_2O \rightleftharpoons Cu_2O+2\ CuH$. The importance of these values in the refining of copper. 13 ref.

2c-32. Investigation of the Formation of Ferrites of Cobalt and Nickel. (In Russian.) T. I. Bulgakova, Ya. I. Gerasimov, Yu. P. Simanov, and L. L. Klyachko-Gurvich. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 18 (80), Jan. 1948, p. 154-164.

The investigation made by solution of reaction products in H_2SO_4; by use of X-ray phase analysis; and by a magnetic method. Rates and temperature ranges of ferrite formation for mixtures of NiO and of CoO with Fe_2O_3.

2c-33. Electrolytic Preparation of Zinc Dust. Walter Eckardt. *Bureau of Mines, Information Circular* No. 7466, May 1948, 6 pages.

Production of Zn dust from sodium zincate solutions, giving details of the commercial method and apparatus developed in Germany.

2c-34. Reactions of Carbon and Metal Oxides in a Vacuum. W. J. Kroll and A. W. Schlechton. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 247-258.

None of the oxides studied were stable in contact with carbon in a vacuum at above 1380° C. Oxides of multivalent metals reacted at temperatures of 700° C. or less. As a method for producing pure metals, best results were obtained with Cr, V, Cb, and Ta. It was concluded that the vacuum reduction method is practical only for production of the more expensive and rare metals. 21 ref.

2c-35. The Preparation and Properties of Pure Titanium. I. E. Campbell, R. I. Jaffee, J. M. Blocher, Joseph Gurland, and B. W. Gonser. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 271-285.

Ductile titanium of high purity is produced by decomposing titanium iodides, formed by the action of iodine vapor upon the crude metal, on a hot filament. Working and mechanical properties.

2c-36. The Oxidation of Chalcocite in Air Compared with Its Oxidation in Pure Oxygen. John R. Lewis, J. H. Hamilton, John C. Nixon, and Curtis L. Graversen. *Metals Technology,* v. 15, June 1948, T.P. 2388, 9 pages.

The use of oxygen or oxygen-enriched air in roasting of copper sulphide minerals. Laboratory work on a pure chalcocite prepared synthetically. Results obtained at various temperatures between 250 and 700° C. The optimum results were obtained near 450° C.

2c-37. Producing an Alloying Element of High Purity. W. L. Hammerquist. *Journal of Chemical Education,* v. 25, July 1948, p. 392-393.

Process developed for production of pure manganese.

2c-38. Influence of Physicochemical Factors on the Loss of Metals of the Platinum Group During Cupellation of Lead. (In Russian.) J. N. Plaksin

and E. A. Marenkov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 209-221.

Experiments were performed with and without silver. The effectiveness of the latter in preventing losses of Pt and Pd and its ineffectiveness with regard to Rh and Ir were established. The amount of Pb retained by the Pt group metals after cupellation with Pb in the absence of silver was determined.

2c-39. Interaction of Tin With Metal Silicates. (In Russian.) D. M. Chizhikov and E. I. Khazanov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 223-228.

Thermodynamic analysis and experimental data concerning the reaction between tin and slags of different compositions showed that increase in temperature aids in complete reduction. Optimum composition for tin smelting is indicated.

2c-40. Electrochemical Dissolution of Metal Sulphides. (In Russian.) D. M. Chizhikov and B. Z. Ustinskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 229-234.

A study of the above for sulphides of Cu, Ni, and Co in an acid electrolyte shows that a current density of 100-300 amp. per sq. m. is required for solution with an average yield of 65%. Sulphur remains in elementary form, forming a crust which increases the necessary voltage.

2c-41. Reactions of Oxides and Sulphides With Metal Chlorides. (In Russian.) G. S. Frents. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 235-238.

The reactions of SnO_2 with chlorides of Fe, Zn, Ca, and Mg; reactions of compounds of Fe and Zn with chlorides of Ca and Mg; and of sphalerite with $FeCl_2$. It was found that the chlorination of cassiterite should be performed at 800° C. in the presence of a reducing agent. Under these conditions certain compounds of other metals are also chlorinated.

2c-42. The Refining of Gold. D. Thomson. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 48, April 1948, p. 307-327.

Methods used for refining of bullion of the Witwatersrand, South Africa.

2c-43. Large-Scale Laboratory Production of Ductile Zirconium. W. J. Kroll, C. Travis Anderson, H. P. Holmes, L. A. Yerkes, and H. L. Gilbert. *Journal of the Electrochemical Society,* v. 94, July 1948, p. 1-20.

Data on the operation of a plant capable of producing about 60 lb. of zirconium per cycle. Operation of the latter involves reduction of zirconium chloride vapor with magnesium in a helium atmosphere and vacuum distillation.

2c-44. Préparation des composés du molybdene et du tungsténe par électrolyse ignée. (Production of Compounds of Molybdenum and Tungsten by Fused-Salt Electrolysis.) J. L. Andrieux and G. Weiss. *Bulletin de la Société Chimique de France,* May-June 1948, p. 598-601.

Methods for preparation of borides, carbides, arsenides, and sulphides of Mo and W, and also for preparation of alloys of W-Sb, Mo-Sb, W-Fe, W-Mn, W-Cr, W-V, W-Ti, and W-Ce, utilizing electrochemical methods. 11 ref.

2c-45. Electrolytic Reduction of Aqueous Tungstate Solutions. M. L. Holt and L. E. Vaaler. *Journal of the Electrochemical Society,* v. 94, Aug. 1948, p. 50-58.

A "catalytic reduction" theory is proposed to explain the electrolytic reduction of aqueous tungstate solutions in the presence of codepositing metals. Two cathode reactions are suggested as being essential to the reduction process. Evidence for the postulated mechanism. 27 ref.

2c-46. The Platinum Metals. A Survey of Their Properties and Engineering Uses. C. A. H. Jahn. *Journal of the Birmingham Metallurgical Society,* v. 28, Sept. 1948, p. 199-243; discussion, p. 244-252.

Previously abstracted from *Metal Industry,* v. 72, March 5-April 2 issues, 1948. See item 2c-23, 1948.

2c-47. Petsamo Nickel. W. Nordin. *Metal Industry,* v. 73, Sept. 3, 1948, p. 183-185. Translated and condensed from *Vuoriteollisuus.*

Development of deposits during Finnish rule, and processes and equipment used for concentration and smelting. The ore is charged directly to an arc furnace, in which, on fusion, the sulphides settle and the gangue is skimmed off. The area is now a part of Russia.

2c-48. Le degazage des bronzes et laitons (Degassing of Bronzes and

Brasses.) Georges Blanc. *Fonderie,* July 1948, p. 1236-1241.

The various methods presently used are discussed under five groups: use of vacuum, air oxidation, use of oxidizing fluxes, bubbling of inert gas through the melt, and remelting. Optimum conditions for each method. 11 ref.

2c-49. Zinc Smelting in the Horizontal Retort Fired With Natural Gas. Parts 1 and 2. G. L. Oldright. *Bureau of Mines, Report of Investigations* No. 4333 and 4334, Aug. 1948, 71 pages and 41 pages.

Development of firing schedules in this process. General conditions of combustion influencing temperatures.

2c-50. Zinc Smelting in the Horizontal Retort Fired with Natural Gas. Part 3. Nature of Retort Charge vs. Rates of Spelter Production. Part 4. Burner Design. G. L. Oldright. *Bureau of Mines, Report of Investigations* No. 4335 and 4336. Sept. 1948, 42 and 111 pages.

2c-51. Lead Refining with Sulfamate Baths. R. Piontelli. *Journal of the Electrochemical Society,* v. 94, Sept. 1948, p. 106-108.

The plant of an Italian firm for electrolytic lead refining with sulphamate baths. 10 ref.

2c-52. Electrowinning of Manganese from Chloride Electrolytes. J. H. Jacobs and P. E. Churchward. *Journal of the Electrochemical Society,* v. 94, Sept. 1948, p. 108-121.

The principal variables of the process were investigated, namely, current density, solution concentrations, pH, temperature, time of deposition, and other optimum conditions. It was concluded that the electrowinning of manganese from a chloride electrolyte is feasible. A comparison between the chloride process and the sulphate process is made, pointing out the chief advantages and disadvantages of each. 11 ref.

2c-53. Pilot-Plant Production of Electrolytic Chromium. R. R. Lloyd, J. B. Rosenbaum, V. E. Homme, and L. P. Davis. *Journal of the Electrochemical Society,* v. 94, Sept. 1948, p. 122-138.

Operation of the Bureau of Mines pilot plant, with emphasis on the techniques necessary to produce an adequately pure chromic sulphate electrolyte from the mixture of metal sulphates obtained by acid dissolution of low-grade ore. Equipment flowsheets and a discussion of materials of construction.

2c-54. Smooth Top vs. Rough Top Ingot. David Magder. *Canadian Metals & Metallurgical Industries,* v. 11, Sept. 1948, p. 25-26.

Pros and cons. Recommends use of rough-top ingot for brass and bronze, because the copper oxide in the rough top helps reduce hydrogen in the melt.

2c-55. An Analysis of the Converting of Copper Matte. E. A. Peretti. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 5 pages.

The Peirce-Smith or horizontal converter. Conditions in the converter during the slag-forming and blister-forming stage.

2c-56. Midvale Lead Smelter for Company and Custom Ores. Casper A. Nelson and Wendell M. Whitecotton. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 548-552.

Flow sheets and procedures of Midvale, Utah, smelter of U. S. Smelting, Refining and Mining Co., for recovery of copper and zinc.

2c-57. Lead Refined Electrolytically at the East Chicago Plant. E. W. Merrick, F. C. Smyers, and F. L. Warner. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 566-568.

Methods used at plant of U. S. Smelting, Refining and Mining Co.

2c-58. Peculiarities in the Thermal Reduction of Metals Using Silicon. (In Russian.) P. V. Gel'd. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 21, 1948, p. 495-498.

The reduction of a chromite ore containing 53.22% Cr_2O_3, 6.71% SiO_2, 12.26% Mg, 9.71% Al_2O_3, and 14.19% FeO was studied. Roasting losses using crystalline silicon containing 97.85% Si were 2.31%. Methods and apparatus.

2c-59. Rare-Metal Metallurgy; Special Production Methods for the Less Common Elements. W. J. Kroll. *Metal Industry* (London), v. 73, Oct. 1, 1948, p. 263-265; Oct. 8, 1948, p. 283-286; Oct. 15, 1948, p. 307-308, 310; Oct. 22, 1948, p. 323-325.

A review. 68 ref.

2c-60. Antimony Smelting. W. Wendt. *Metal Industry,* v. 73, Oct. 15, 1948, p. 303-305; Oct. 22, 1948, p. 329-330.

Surveys development, in Europe, of the blast-furnace smelting of antimony. A detailed description of an up-to-date installation and of its operation.

2c-61. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XXV. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, Oct. 1948, p. 685-691.

Tin sources, refining, uses, elec-

trodeposition, and tin compounds and their uses.

2c-62. Commercial Production of Electrolytic Manganese. C. L. Mantell. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 232-243.

Manufacture of the above by electrowinning in a two-compartment cell with a sulphate electrolyte is described and properties of the pure metal are given. Applications are outlined. 15 ref.

2c-63. Reduction of Nickel Minerals. *Chemical Engineering,* v. 20, Nov. 1948, p. 338, 340. Translated and condensed from "Reduction of Silicate Minerals of Nickel With Carbon Monoxide", D. P. Bogatskii, *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, no. 1-2, 1947, p. 81-88.

Results obtained with five Russian ores using CO for the reduction.

2c-64. Copper Conversion. W. H. Dennis. *Mine & Quarry Engineering,* v. 14, Nov. 1948, p. 341-344.

Process and equipment for conversion of copper matte to blister copper.

2c-65. Effect of Gases on Tin Bronze. II. (Concluded.) Clyde L. Frear. *Foundry,* v. 76, Dec. 1948, p. 96, 158, 160, 162.

Recommends various procedures for the prevention of shrinkage porosity.

2c-66. Production and Properties of Nonferrous Metals. Webster Hodge. *Metals Review,* v. 21, Nov. 1948, p. 3, 5.

Developments reported in recent literature. References to "A.S.M. Review of Current Metal Literature."

2c-67. Belgique, berceau de la métallurgie du zinc. (Belgium, The "Cradle" of the Development of the Metallurgy of Zinc.) Claude Decroly. *Atomes,* v. 3, May 1948, p. 153-157.

Outlines history. The production of zinc in Belgium and the metallurgy involved.

2c-68. Vacuum Processing; Method of Reducing Porosity in Copper Ingots. R. A. Stauffer, K. Fox, and W. O. DiPietro. *Metal Industry,* v. 73, Nov. 12, 1948, p. 389-392. A condensation.

Previously abstracted from *Industrial and Engineering Chemistry,* v. 40, May 1948, p. 820-825. See item 2c-29, 1948.

2c-69. A Visit to the Carteret Copper Refinery. John V. Beall. *Mining and Metallurgy,* v. 29, Dec. 1948, p. 658-659.

Refinery practice and equipment.

2c-70. Uber die Einwirkung von Luft auf flussiges Zink. (The Effect of Air on Molten Zinc.) Erich Gebhardt. *Metallforschung,* v. 1, Sept. 1946, p. 87-96.

Results of research on the problem—of special importance in smelting and casting—with special emphasis on the effect of small additions of different metals to the melt in preventing the formation of oxides and nitrides.

2c-71. Electrolytic Cobalt—A Commercially Feasible Process. F. K. Shelton and others. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 115-131; discussion, p. 131.

Previously abstracted from preprint. See item 2-15, 1947.

2c-72. Recent Developments on the Preparation of Zirconium. W. C. Lilliendahl and H. C. Rentschler. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 285-294; discussion, p. 295-297.

Previously abstracted from preprint. See item 2-79, 1947.

2c-73. Gas Absorption Phenomena and Degasification of Cast Monel. Bernard N. Ames and Noah A. Kahn. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 558-573; discussion, p. 573.

Previously abstracted from preprint. See item 2c-17, 1948.

2d—Light Metals

2d-1. Aluminum Refining. *Metal Industry,* v. 71, Nov. 28, 1947, p. 447-449; Dec. 5, 1947, p. 467-469. Based on recent F.I.A.T. report.

A review of recent German developments. Four methods are utilized: dissolution, oxidation, volatilization, and electrolysis.

2d-2. Some Factors in the Reduction of the Iron Content of Magnesium-Base Alloys. II. Production-Scale Experiments. F. A. Fox, C. J. Bushrod, and S. E. Mayer, *Magnesium Review and Abstracts,* v. 7, Jan. 1947, p. 23-36.

Reprinted from *Journal of the Institute of Metals,* v. 73, no. 2, 1946.

2d-3. Degassing Aluminum Alloys; Experiments With Chlorine and Hexachlorethane. M. Grand. *Metal Industry,* v. 72, Jan. 9, 1948, p. 29-30.

Degassing agents, effect of degassing on alloy composition, and amount of porosity caused by gas. Light alloys are classified in order of affinity for gas. (Condensed from paper presented before 21st Congress of Association Technique de Fonderie, Paris.)

2d-4. Aluminum-Silicon Alloys by Electrothermal Reduction of Clay With Coke. *Metallurgia,* v. 37, Dec. 1947, p. 111-112.

Reviews recent papers.

2d-5. Sur une Méthode d'Obtention des Métaux. (A Method for Obtaining Metals) Part II. Raymond Lautie and André Moutet. *Bulletin de la Société Chimique de France,* Sept.-Oct. 1947, p. 881-883.

Beryllium and magnesium minerals are reduced under vacuum by calcium carbide. These are then recovered by distillation in a very pure state in yields exceeding 80%.

2d-6. Conditions for Reduction of Silicon Dioxide in the Presence of Aluminum and Calcium Oxides. (In Russian.) Yu. K. Delimarskii and S. D. Shargorodskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Aug. 1947, p. 781-793.

Experimental investigation designed to improve the process for recovery of alumina from clay and kaolin. The material contains several oxides, including SiO_2, Al_2O_3. Ca, Fe_2O_3, TiO_2, and others. Equilibrium was established at 1650° to 1700° C. in the slag-metal system investigated. At higher temperatures, the degree of silicon reduction inceases, reaching 89% at 1750° C.

2d-7. German Methods of Producing Alumina and Aluminum. *Light Metal Age,* v. 7, April 1948, p. 10-14.

Based on several B.I.O.S. reports from which flow diagrams are reproduced.

2d-8. Le Dégazage des Alliages d'Aluminium. (Degasification of Aluminum Alloys.) Louis Grand. *Fonderie*, Dec. 1947, p. 975-978; discussion, p. 979.

Various methods were investigated. The influence of degassing on crystal structure and mechanical properties.

2d-9. The Production of Beryllium. Bengt R. F. Kjellgren. *Journal of the Electrochemical Society,* v. 93, April 1948, p. 122-128.

Reduction of beryllium fluoride with magnesium. Impure grades of beryllium oxide are dissolved in aqueous solutions containing ammonium bifluoride. Pure crystals of ammonium beryllium fluoride are produced from the solution. These crystals are decomposed by heating into beryllium fluoride and ammonium fluoride. Metallic beryllium is produced by heating the beryllium fluoride with magnesium. 13 ref. (Prepared for delivery at Columbus, Ohio, meeting of the Society, April 14-17, 1948.)

2d-10. A Recent Development in Metallurgical Technique as Applied to Magnesium Alloys. F. A. Fox. *British Science News*, v. 1, No. 7, 1948, p. 13-15.

The application of a process known as "superheating", to achieve fine-grained castings. Refers to use of hexachlorethane in aluminum-containing alloys to avoid the necessity of superheating and to aid in elimination of hydrogen.

2d-11. Some Notes on the Production and Engineering Properties of Magnesium Alloys. F. A. Fox. *Machinery Lloyd* (Overseas Edition), v. 20, May 8. 1948, p. 68-77.

Production methods, properties of the various alloys; fabrication procedures; surface protection; and applications.

2d-12. Controverse sur le mécanisme de l'Electrolyse dans les cuves a aluminium. (Controversy Concerning the Mechanism of the Electrolysis Involved in Production of Aluminum.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, Jan.-Feb. 1948, p. 8-12.

Resumé of extensive discussion and written communications presented at several meetings of Sociéte Francaise des Electricians during 1947.

2d-13. Le dégazage des alliages d'aluminium. (Degasification of Aluminum Alloys.) Louis Grand. *Fonderie,* March 1948, p. 1075-1086.

Different methods (using chlorine or hexachloroethane) were investigated. Influence on composition and mechanical properties.

2d-14. Die schweizerische Aluminiumerzeugung. (Production of Aluminum in Switzerland.) A. von Zeerleder. *Chimia,* v. 2, April 10, 1948, p. 69-75.

Methods used.

2d-15. Alumina From Clay by the Lime-Sinter Method. Part II. F. R. Archibald and C. M. Nicholson. *Metals Technology,* v. 15, June 1948, T.P. 2390, 25 pages.

Treatment of clays found in very extensive deposits in the Carolinas and Georgia using the lime-sinter process. Limestone and kaolin are mixed and fired until the silica is converted to dicalcium silicate and alumina to calcium aluminate. The sinter is leached with Na_2CO_3 solution and filtered. Alumina trihydrate is precipitated from the filtrate by CO_2, filtered, and dehydrated to alumina.

2d-16. Melting Magnesium. F. A. Allen. *Light Metals,* v. 11, June 1948, p. 358-360.

Methods used and suggestions for improvements.

2d-17. Probleme der Nichteisenmetallurgie. (Problems of Nonferrous Metallurgy). Paul Röntgen. *Metall,* Dec. 1947, p. 104-108.

Two problems in the metallurgy

of aluminum: mechanism of the reactions in the electrolysis of aluminum; and the production of aluminum from clay. Several different methods of production are critically discussed.

2d-18. The Electrolytic Production of Aluminum. Francis C. Frary. *Journal of the Electrochemical Society,* v. 94, July 1948, p. 31-40.

The development of methods. Problems involving heat loss, anode effect, and removal of aluminum from the bath, and modern methods of their solution. Construction and operation of the newest type of the Soderberg electrode is detailed and reference is made to the three-layer electrolytic refining process by which very high purity aluminum is obtained. 26 ref.

2d-19. Extraction of Alumina from High-Iron Bauxites. Frank J. Cservenyak, John Ruppert, and David E. Garen. *Bureau of Mines, Report of Investigations* No. 4299, June 1948, 29 pages.

Result of an investigation of processes for production of alumina from low-grade ores. Tests are restricted to sintering and leaching by the lime-soda sinter process. Flowsheet for this method.

2d-20. Super-Purity Aluminium. (Concluded.) *Metal Industry,* v. 73, July 23, 1948, p. 71-72; July 30, 1948, p. 86-88.

Procedures in scrap refining by three-layer electrolysis.

2d-21. On Some Equilibria Involving Aluminium Monohalides. P. Gross, C. S. Campbell, P. J. C. Kent, and D. L. Levi. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 10 pages.

A simple method of determining vapor or reaction pressures by comparing them with a known equilibrium pressure, such as a vapor pressure. The reliability of the method was established by comparing the vapor pressures of lead and potassium chloride. The method was used to determine the reaction pressures of aluminum with sodium and potassium chlorides. From these pressures and the entropy of AlCl, obtained from spectroscopic data, the heat of formation of AlCl was derived.

2d-22. The Vapour Pressure of Magnesium in the Thermal Reduction of MgO by Ferrosilicon. L. M. Pidgeon and J. A. King. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 10 pages.

Experimental methods in the production of magnesium metal: reduction of MgO by carbon, and reduction by a metal or metalloid, the oxide of which is nonvolatile at the temperature of the operation.

2d-23. A New Electrolytic Cell for Magnesium and Chlorine Production. B. G. Hunt. *Journal of the Electrochemical Society,* v. 94, Oct. 1948, p. 151-160.

Design features close spacing of electrodes, elimination of the usual refractory partition between anode and cathode, and a separate metal well. The major objectives—simple and compact design, low power consumption, and direct casting of metal from the cell—have been realized with the added advantage of high chlorine-gas strength.

2d-24. Twenty-Five Years' Development of the Soderburg System in Aluminum Furnaces. M. Sem, J. Sejersted, and O. Bockmann. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 220-231.

A new type of electrode with vertical contact studs, direct collection of the furnace gas, and gas burner. These have given excellent results in large furnaces of 60,000 amp. or more, and combine the advantages of both open and closed furnaces.

2d-25. Technology of Aluminum and Magnesium. Charles M. Craighead. *Metals Review,* v. 21, Nov. 1948, p. 7, 9.

Developments in production and properties. References to "A.S.M. Review of Current Metal Literature."

2d-26. Metal Oxides; Behaviour in the Electrolytic Process for Aluminium Production. *Metal Industry,* v. 73, Nov. 12, 1948, p. 393. Translated and condensed from article by J. W. Fischer, *Angewandte Chemie.*

Theortical aspects and experimental data relating to the behavior of a number of metal oxides either intentionally added to, or introduced as impurities into, the aluminum-reduction furnace.

2d-27. Aluminum From a Fused Chloride Bath. Colin G. Fink and Dushyant N. Solanki. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 203-218; discussion, p. 219.

Previously abstracted from preprint. See item 2-78, 1947.

SECTION III

PROPERTIES

3a—General

3a-1. Alloys for Severe High-Temperature Service. W. C. Leslie and D. J. McPherson. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 42-47.

Past developments. Work at Ohio State on Timken 16-25-6 alloy (Cr-Ni-Mo steel) and on Cr-Ti binary alloys.

3a-2. Permanent Magnet Alloys. Earl M. Underhill. *Electronics*, v. 21, Jan. 1948, p. 122-123.

Nominal magnetic, physical, and mechanical characteristics of 42 types of magnet steels, cast magnets, magnetic alloys, and sintered magnets are tabulated.

3a-3. A Connection Between the Criterion of Yield and the Strain Ratio Relationship in Plastic Solids. Geoffrey Taylor. *Proceedings of the Royal Society (Series A)*, v. 191, Dec. 3, 1947, p. 441-446.

The assumption that the work involved in small plastic strains reaches a maximum when the yield-stress criterion is varied leads to a relationship between the yield-stress and the strain-ratio relationship. It is usually assumed that the stress-strain relationship is one of simple proportionality. Experiments, however, show that this assumption is not true for metals. The observed relationship is used in conjunction with the assumption of maximum work during a given strain to calculate the criterion of yield. It is found that this is very close to, but not identical with, the Mises-Hencky criterion.

3a-4. Jet Engine Progress Keyed to Fabrication; Metallurgy. *SAE Journal*, v. 56, Jan. 1948, p. 66-67. Based on "The Metallurgical Aspects of Turbine Wheels and Nozzles", by E. M. Phillips.

Preprint previously abstracted. See 3-355, R. M. L., v. 4, 1947.

3a-5. Beschouwingen bij de Vervormingloze en Brosse Breuken. (The Phenomenon of Brittle Fracture Without Deformation.) W. Soete. *Metalen*, v. 2, Nov. 1947, p. 41-45; Dec. 1947, p. 65-75.

The shear-strain-energy theory and the maximum-normal-stress law are considered as plausible criteria for deformation and fracture. The influence of nonuniformity of stressing and strain hardening on flow and fracture strength are investigated. A survey of factors influencing the resistance of the metals is given. 17 ref.

3a-6. Impact Strength and Hardness of Aircraft Alloys Down to −423° F. M. G. Fontana and J. L. Zambrow. *Metal Progress*, v. 53, Jan. 1948, p. 97-100.

Data are presented from a study of Charpy keyhole-notch specimens and hardnesses of some Al and Mg alloys and steels used in aircraft construction, when cooled to temperatures close to absolute zero.

3a-7. Oiliness and Boundary Phase Friction. H. Umstätter. *Engineers' Digest* (American Edition) v. 4, Dec. 1947, p. 570-572. Translated and condensed from *Die Technik*, v. 2, April 1947, p. 171-176.

In order to develop a mathematical relationship between boundary phase friction and the various factors by which it is affected, a formula for viscosity, based on the damping theory of internal friction, is used. This formula includes the density and the molecular weight of the lubricant. A relationship between surface tension and thermal oscillation frequency is developed and used to calculate frequency values for over 100 different chemicals. The degree of mutual solubility of two materials improves as their thermal oscillating frequencies approach each other. This fact may be used to predict the performance of suggested bearing alloys and lubricants and to explain known facts.

3a-8. Temperature Vs. Permeability in Nickel-Iron Alloys. Laurence C. Hicks. *Steel Horizons*, v. 10, no. 1, 1948, p. 16-17.

Experimental data for four alloys known as Mumetal, 4750, Monomax,

and Sinimax; compositions are given.

3a-9. The Importance of Ultimate Extension as an Engineering Property of Materials. A. Fisher. *Magnesium Review and Abstracts,* v. 7, Jan. 1947, p. 3-17.

Reprinted from *Metallurgia,* v. 34, June 1946, p. 200. See Item 3-132, R.M.L., v. 3, 1946.

3a-10. Dislocation Theory of the Fatigue of Metals. E. S. Machlin. *National Advisory Committee for Aeronautics, Technical Note* No. 1489, Jan. 1948, 33 pages.

Theory for annealed solid solutions and an equation giving dependence of number of cycles for failure on stress, temperature, material parameters, and frequency for uniformly stressed specimens. A quantitative correlation between fatigue and creep was verified. 26 ref.

3a-11. Fundamental Considerations Regarding Friction. A Mitinsky. *Metal Progress,* v. 53, Jan. 1948, p. 102.

Friction is defined as loss of energy due to permanent deformation and local rupture within the parts in contact.

3a-12. Flow, Fracture and Ductility of Metals. D. J. McAdam Jr., G. W. Geil, and Frances Jane Cromwell. *Metals Technology,* v. 15, Jan. 1948, T. P. 2296, 30 pages.

Results of an investigation of the flow of notched and unnotched specimens of oxygen-free copper, monel, and ingot iron between yield and fracture. A study has thus been made of the flow and fracture of metals as affected by the stress system, and of the ductility of metals as affected by the stress system throughout plastic deformation. 34 ref.

3a-13. Metallic Creep. A. H. Sully. *Research,* v. 1, Oct. 1947, p. 19-24.

The phenomenon, its measurement, physical significance, and metallurgical aspects; and the development of creep resistant alloys.

3a-14. A Comparison of the Brittle Transition Temperatures as Determined by the Charpy Impact and the M.I.T. Slow Bend Tests. C. W. MacGregor and N. Grossman. *Welding Journal,* v. 27, Jan. 1948, p. 16s-19s.

Results of slow bend and Charpy impact tests on three different steels. Results show that the slow bend tests predict transition temperatures which lie on the upper knee of the Charpy "S" curve shortly before the sudden drop-off in energy values.

3a-15. Thermal Expansion Properties of Iron-Cobalt Alloys. M. E. Fine and W. C. Ellis. *Metals Technology,* v. 15, Feb. 1948, T. P. 2320, 13 pages.

Properties for temperatures from 30 to 850° C., correlation with other physical properties, and an explanation for the interrelation. 17 ref.

3a-16. The Thermodynamics of Irreversible Processes. IV. The Theory of Elasticity and Anelasticity. Carl Eckart. *Physical Review,* v. 73, Feb. 15, 1948, p. 373-382.

The traditional theory of the solid state is said to rest on two false assumptions. One is the principle of a constant relaxed (or standard) state. The other is the principle of relaxability-in-the-large, first formulated mathematically by DeSaint-Venant. It is shown that a principle of relaxability-in-the-small is sufficient for the geometry of strain—which then becomes a 3-dimensional Riemannian geometry. The kinematics of strain is next developed without introducing the principle of a constant relaxed state. A classical theory of anelasticity is established on this basis. The results are used to derive the equations for the waves of distortion and dilation in an ideal isotropic anelastic medium.

3a-17. Statistical Theory of the Elementary Process of Plastic Deformation. W. James Lyons. *Physical Review,* v. 73, Feb. 15, 1948, p. 413-414.

3a-18. The Propagation of Shock Waves in Steel and Lead. D. C. Pack, W. M. Evans, and H. J. James. *Proceedings of the Physical Society,* v. 60, Jan. 1, 1948, p. 1-8.

An investigation was made of the stress system set up by an explosive detonating in contact with a metal surface. The time taken by the fastest pulse to penetrate various lengths of steel and of lead was measured experimentally. The results show that the plane elastic waves move more quickly for steel; while for lead the shock wave before damping has a velocity well in excess of that of the elastic waves.

3a-19. The Variation With Temperature of Metallic Reflectivity. Robert Weil. *Proceedings of the Physical Society,* v. 60, Jan. 1, 1948, p. 8-13.

Assuming free electrons alone to be responsible for the mechanism of metallic reflection, there is a wave length at which the temperature variation of reflectivity is zero. Since this wave length is directly proportional to the time of relaxation of the electrons, it must vary with the temperature. The effect of

the bound electrons is also considered.

3a-20. Determination of Endurance Limit During Repeated Bending of Steel or Light Alloys on the Basis of Their Tensile Strength. (In Russian). S. L. Zhukov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1245-1252.

Possibility of correlation of endurance limits and tensile strengths. Investigation of a large amount of data from the literature resulted in development of correlation formulas. The formula for light alloys differs slightly from that for steels.

3a-21. Statistical Aspects of Fracture Problems. Benjamin Epstein. *Journal of Applied Physics,* v. 19, Feb. 1948, p. 140-147.

In recent years there has been an increasing interest in the development of statistical theories of strength. A main aim of these theories is to explain such things as dependence of strength of specimens on volume or length. It is pointed out that the problems posed by these models are equivalent to an important problem in mathematical statistics and that the calculations made by mathematical statisticians give a far more complete description of the results to be expected than do the estimates found up to now in the technical literature. 15 ref.

3a-22. A Neglected Problem in Physical Metallurgy. Michael G. Corson. *Metal Progress,* v. 53, Feb. 1948, p. 248-249.

Existing values of E and G (moduli of elasticity in pure tension and pure shear, respectively) for 11 metals vary more than 10% from the average value in 9 of 22 citations in "Handbuch der Physikalischen und Technischen Mechanik". Questions validity of the theoretical relationship among E, G, modulus of elasticity in uniform compression (K), and ratio of radial contraction to axial elongation in pure tension ψ. It is thought possible that E and ψ are not even true constants. Also considers the problem of pure tension, pointing out that there is no way for loading either a test bar or a structural member in that manner. A tentative formula of ratio of surface stress to average stress is derived and research on effects of alloying and working on compressibility is suggested.

3a-23. Plastics in Business Machines. R. G. Chollar. *Modern Plastics,* v. 25, Feb. 1948, p. 111-115.

Eight typical business-machine-part applications which illustrate factors involved in substitution of plastics for metals in small parts. Comparative mechanical, physical, electrical, and chemical properties of nine common plastics and of steel, aluminum, magnesium, and zinc.

3a-24. The Rupture Test Characteristics of Heat Resistant Sheet Alloys at 1700 and 1800° F. J. W. Freeman, E. E. Reynolds, and A. E. White. *National Advisory Committee for Aeronautics, Technical Note No.* 1465, Feb. 1948, 61 pages.

The materials studied included the standard Cr-Ni types 330, 310, 310 S, and four experimental alloys containing Co, Mo, W, and B in addition to Ni and Cr.

3a-25. Sleeve Bearing Metals. C. H. Hack. *National Lead Co. Research Laboratories,* Brooklyn, 43 pages.

Various types and compositions. Mechanical, physical, and chemical requirements. (This paper will be included in "Encyclopedia of Chemical Technology", to be published by Interscience Encyclopedia, Inc., N. Y.)

3a-26. A Simple Theory of Static and Dynamic Hardness. D. Tabor. *Proceedings of the Royal Society* (Series A), v. 192, Feb. 4, 1948, p. 247-274.

When a spherical indenter is pressed into a softer metal, plastic flow occurs. The permanent indentation is spherical in shape, but its radius of curvature is greater than that of the indenter. This is believed to be due to release of elastic stresses. If recovery is truly elastic it should be reversible and a second application and removal of the indenter under the original load should not change the size or shape of the indentation. Experiments show that this is true and that there is close agreement between the observed deformation and that calculated from Hertz's equations. The energy involved in elastic recovery is found to account for the energy of rebound of the indenter. This analysis explains a number of empirical relations observed in dynamic-hardness measurements, and also the calibration characteristics of the rebound scleroscope. The results also show that dynamic hardness of very soft metals is very much higher than static hardness and indicates that forces of a quasi-viscous nature are involved. Finally, a simple theory of hardness based on the theoretical work of Hencky and Ishlinsky is presented. It is shown experimentally that for a material incapable of appreciable work-hardening, the mean pressure required to

produce plastic yielding is related to the elastic limit by an empirical relationship. 27 ref.

3a-27. The Flow of Metals Under Various Stress Conditions. A. L. Nadai. *Institution of Mechanical Engineers, Proceedings,* v. 157, War Emergency Issue No. 28, 1947, p. 121-160.

Means for dealing with finite strains of an order of 10 to 100 or more times larger than strains that can be sustained elastically. Certain new types of strains are introduced. Several ideal substances, representing behavior of metals or other materials under different conditions. For a perfectly plastic substance a special solution is given for a plane problem and for plastic shells with rotational symmetry. A case of creep of metals at elevated temperatures. Experiments on propagation of the plastic zone along mild-steel bars under tension, on flow of copper and of medium carbon steel under combined stresses in the strain hardening range (including description of the fractures which were observed), and experiments on effect of speed of deformation of these metals at normal and elevated temperatures over a wide range of strain rates.

3a-28. Abrasion, Erosion and Corrosion. *Chemical Age,* v. 58, Feb. 7, 1948, p. 207. Condensed from paper by C. H. Desch.

Reviews progress in the study of metal surfaces. (Presented to Chemical Engineering Group, Society of Chemical Industry.)

3a-29. Wear and Defects of Engine Bearings. F. Picard. *Engineers' Digest,* v. 5, Feb. 1948, p. 73-74. Translated and condensed from *Le Genie Civil,* v. 124, June 15, 1947, p. 233-235.

Derives a new coefficient of wear and defines more closely certain specified defects of bearings.

3a-30. Fatigue Characteristics of Rotating-Beam Versus Rectangular Cantilever Specimens of Steel and Aluminum Alloys. F. B. Fuller and T. T. Oberg. *A.S.T.M. Advance Print* AP4, 1947, 12 pages; discussion, p. 9-12.

Results of fatigue tests conducted in Krouse vibratory nonrotating cantilever beam and R. R. Moore rotating-simple-beam fatigue-testing machines. Specimens were machined from extruded shapes of 75 S-T, 24 S-T, 14 S-T, and R 303 aluminum alloys and from S.A.E. 4130, flat, steel plate of several degrees of hardness.

3a-31. The High-Temperature Fatigue Strength of Several Gas Turbine Alloys. P. R. Toolin and N. L. Mochel. *A.S.T.M., Advance Print* AP9, 1947, 17 pages; discussion, p. 16-17.

Results of a program to determine fatigue characteristics of many proposed gas turbine alloys at temperatures of 1200° F. and above. Results are given on alloys whose compositions range from the older 18% Cr, 8% Ni type to the newer more highly alloyed materials. Both wrought and precision-cast (lost-wax process) materials were tested. High-temperature fatigue machine used in this study. 18 ref.

3a-32. Magneto-Spin Resonance in Ferromagnetic Materials Induced by Waves in the Centimeter Range. (In Russian.) E. K. Zavoiskii. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 17, Oct. 1947, p. 883-888.

Phenomenon was investigated in a series of ferromagnetic alloys such as electrolytic nickel, transformer iron, and alloys of the "Mishima" type (composition not given).

3a-33. Influence of the Arrangement of Magnetic Moments on the Magnetic Properties of Polycrystalline Ferromagnetic Materials. (In Russian.) M. V. Dekhtyar and G. M. Raiskaya. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 17, Oct. 1947, p. 911-914.

Results of a correlation of experimental data. 10 ref.

3a-34. On Creep and Relaxation. Part II. B. Gross. *Journal of Applied Physics,* v. 19, March 1948, p. 257-264.

In a previous paper the theory of the transient effects caused by the sudden application of constant load or constant deformation was developed. In the present paper, the theory of the steady-state behavior under alternating load and deformation is given. Relations are established between loss factor, storage factor, distribution functions, and Laplace transforms of the creep, and of the relaxation, functions. 25 ref.

3a-35. Slow Neutron Velocity Spectrometer Studies of Cu, Ni, Bi, Fe, Sn and Calcite. W. W. Havens, Jr., L. J. Rainwater, C. S. Wu, and J. R. Dunning. *U. S. Atomic Energy Commission,* MDDC-1645, Sept. 22, 1947, 31 pages.

Data reviewed. 37 ref.

3a-36. Theory of the Mechanical Properties of Solids. (In Russian.) V. Zhdanov and V. Konusov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and

Theoretical Physics), v. 17, Nov. 1947, p. 976-985.

Equations of state and modulus of elasticity for single-atom lattices are proposed. The moduli and the criteria of lattice stability are investigated on the basis of potential-energy parameters.

3a-37. Diffusion in Molten Metals. (In Russian.) A. M. Samarin and L. A. Shvartsman. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1649-1651.

Applies the basic Stokes-Einstein formula. Results of experiments on Li, Na, K, Rb, Cs, Ca, Sr, Ba, Au, Ga, Zn, Pb, Tl, Cd, and Ag show that theoretical coefficients of diffusion do not differ greatly from experimental ones.

3a-38. Interpretation of the Coefficient of Strength of Metals. (In Russian.) I. A. Oding. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1713-1719.

Coefficient is derived from Nadai's equation for plastic deformation. It is assumed to be a composite value composed of modulus of elasticity and coefficient of relaxation.

3a-39. The Adiabatic Temperature Changes Accompanying the Magnetization of Some Ferromagnetic Alloys in Low and Moderate Fields. L. F. Bates and E. G. Harrison. *Proceedings of the Physical Society,* v. 60, March 1948, p. 213-225.

The method of Bates and Weston for measuring the small heat changes which occur as a ferromagnetic substance is taken through a single hysteresis cycle was extended to seven ferromagnetic alloys. In every case cooling was initially observed as the magnetization of the specimen was reduced from its maximum value. Indications were found that large changes in thermomagnetic properties are caused by small changes in composition, particularly when similar to that of invar. Results in terms of modern domain concepts of ferro-magnetic processes.

3a-40. Damping Capacity of Metals. E. V. Potter. *Bureau of Mines, Report of Investigations* No. 4194, March 1948, 48 pages.

Work which has been done as described in the literature. Various test methods, their theory and accuracy; fundamental mechanisms contributing to energy losses and their relative magnitudes; and the relation between damping capacity and other properties of materials. Also discusses the various units for expressing damping capacity; the choice of testing methods; the importance of damping capacity in engineering; and practical applications of damping-capacity measurements. 49 ref.

3a-41. Theory of the Anomalous Skin Effect in Metals. G. E. H. Reuter and E. H. Sondheimer. *Nature,* v. 161, March 13, 1948, p. 394-395.

In order to put Pippard's provisional theory of the anomalous effects on a more rigorous basis, his equations are reformulated using the methods of the modern electron theory of metals. Explicit solutions are obtained which make it possible to give a quantitative account of the phenomena to be expected over the whole frequency and temperature range.

3a-42. Selection of Engineering Materials for Coke Plants. C. F. Pogacar. *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 439-442.

Important properties of metals usually considered in their selection. Examples; weaknesses in each case and corrective measures.

3a-43. A Summary of Heat Resistant Alloys from 1200 to 1800° F. Nicholas J. Grant, A. F. Frederickson, and M. E. Taylor. *Iron Age,* v. 161, March 18, 1948, p. 73-78; April 8, 1948, p. 75-81; April 15, 1948, p. 84-93.

Conducted as a project of the U. S. Navy Bureau of Ships, this summary correlates and evaluates data produced over the past seven years by various industrial and governmental sources. Relative stress-rupture data, and creep properties at various temperature levels. Compositions of some 53 alloys, together with physical property data for most of the alloys. Effects of temperature, grain size, composition, and aging on rupture and creep properties. The degree of control necessary to standardize these variables. Stress-to-rupture and elongation values for some of the more promising forged and cast alloys at various temperature levels. Relative mechanical properties of the 53 alloys.

3a-44. Laws of Deformation of Solid and Liquid Bodies. (In Russian.) G. Gurevich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1490-1502.

It is shown that Maxwell's well-known equation of relaxation, when exponential dependence of the time of relaxation on stress is assumed,

may be used as a first approximation to express the process of deformation of amorphous and crystalline bodies. 15 ref.

3a-45. Abrasion, Erosion and Corrosion; Surface Damage to Metals. I. Berkovitch. *Iron and Steel,* v. 21, April 1948, p. 116.

Recent work on theory and techniques for study of surface structure.

3a-46. Secondary Emission. Part I. L. R. Koller. *General Electric Review,* v. 51, April 1948, p. 33-40.

The phenomenon of emission of secondary electrons, factors influencing yield and distribution, and some ingenious means of measuring them. Tables of values of maximum secondary yield and corresponding voltage of many metals. (To be continued.) 14 ref.

3a-47. Influence of Small Elastic Stresses on the Initial Transformation Susceptibility of Ferromagnetic Substances. (In Russian.) S. V. Vonsovskii. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 17, Dec. 1947, p. 1094-1105.

Dependence of above susceptibility on low external stresses was established. It is shown that it depends primarily on the magnetic structure of the test specimen, and has maximums and minimums whose locations are defined by the "toughness" of the specimen. 10 ref.

3a-48. Electron Emission From Metal Surfaces. L. A. DuBridge. *American Journal of Physics,* v. 16, April 1948, p. 191-198.

Development of theory. (An address.) 10 ref.

3a-49. Statistical Analysis of the Relationship Between the Properties of Materials and the Useful Life of the Products. (In Russian.) N. P. Shchapov. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R. 1946, p. 185-194.

Details of a statistical method developed.

3a-50. The Stopping Power of a Metal for Alpha-Particles. H. A. Kramers. *Physica,* v. 13, Aug. 1947, p. 401-412.

A theoretical, mathematical development.

3a-51. Inelastic Scattering of Fast Neutrons by Fe, Pb, and Bi. L. Szilard and Others. *Physical Review,* v. 73, June 1948, p. 1307-1310.

Experiments at the metallurgical laboratory of the University of Chicago under the auspices of the Manhattan District.

3a-52. Selecting Engineering Materials for Coke Plants. C. F. Pogacar. *Steel,* v. 122, June 7, 1948, p. 111, 114, 116, 118, 120, 123, 126.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 439-442; May 1948, p. 555-559. See item 3a-42, 1948.

3a-53. These New Metals Challenge Old Stand-bys. *Modern Industry,* v. 15, June 1948, p. 50-53.

Several advantages of titanium, zirconium, and molybdenum as substitute metals for chromium, tungsten, and even aluminum and steel.

3a-54. Low-Temperature Test Witnessed by Engineers. *Welding Journal,* v. 27, June 1948, p. 456-457.

Results of a test of various metal experimental vessels at liquid nitrogen temperatures of below —300° F. The metals tested were 8½%-Ni steel, A.I.S.I. 2800; stainless steel, Type 304; and carbon steel, A.S.T.M. A-201. There was no material damage to the 8½%-Ni and stainless-steel vessels, while a carbon-steel vessel was shattered upon the first impact.

3a-55. High Temperature Bolting Materials. Ernest L. Robinson. *American Society for Testing Materials, Preprint* No. 16S, 1948, 22 pages.

Performance data on a series of materials suitable for use at various temperatures from room to 1500° F.

3a-56. An Experimental Study of the Influence of Various Factors on the Mode of Fracture of Metals. P. G. Jones and W. J. Worley. *American Society for Testing Materials, Preprint* No. 17, 1948, 15 pages.

Experimental results for three steels and an aluminum alloy. The effect of strain aging on the mode of fracture of a semikilled steel and a rimmed steel. Temperatures from room to −310° F. were used in desition from ductile to brittle fracture.

3a-57. Theory of Ferromagnetism of Binary Alloys. (In Russian.) S. V. Vonsovskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 131-144.

A simple generalization of the quantum theory of ferromagnetic materials for binary alloys. Dependence of the Curie point of such alloys on the concentration of their components and on structural arrangement of the atoms. It is shown that, at low temperatures, the relationship of spontaneous magnetization to temperature is the same as for pure metals. 21 ref.

3a-58. Concerning Peculiarities of the Variation of Electrical Conductivity of Several Ferromagnetic Alloys in a Magnetic Field. (In Russian.) S. V. Vonsovskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 145-148.

A theoretical analysis of the Thompson effect for a series of ferromagnetic substances.

3a-59. Concerning Changes of Electrical Conductivity in a Magnetic Field (Thompson Effect) in Alloys Having High Coercive Force. (In Russian.) V. I. Drozhzhina and Ya. S. Shur. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 149-152.

Investigation to determine the relationship between coercive force and Thompson effect for an alloy containing 58% Fe, 27% Ni, and 15% Al. Thompson-effect measurements for Fe, 4%-Si; and for 52%-Co, 10%-V, 38%-Fe alloys.

3a-60. Influence of Degree of Order and Composition on the Hall Effect in Alloys During Approach to an Ordered State. (In Russian.) A. A. Smirnov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 153-160.

Determination of the Hall constant at various stages during the formation of solid solutions. Despite the fact that the mathematical analysis was done on the basis of simplified models, the author believes that the basic qualitative conclusions are valid.

3a-61. Influence of Relaxation and Recrystallization on the Magnetic Properties of Soft Magnetic Materials. (In Russian.) V. I. Drozhzhina, M. G. Luzhinskaya, and Ya. S. Shur. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 167-174.

Investigation for transformer steel (96% Fe, 4% Si) and for molybdenum permalloy (78.5% Ni, 4% Mo, 17.5% Fe), showing effects of different degrees of deformation and of different heat treating schedules.

3a-62. Influence of Size and the Stress System on the Flow Stress and Fracture Stress of Metals. D. J. McAdam, Jr., G. W. Geil, D. H. Woodard, and W. D. Jenkins. *Metals Technology,* v. 15, June 1948, T.P. 2373, 19 pages.

Results of an investigation of the influence of a wide range of sizes of specimens on the flow stress and fracture stress of both notched and unnotched cylindrical specimens of annealed low-carbon steel and oxygen-free copper. Data for flow and fracture of unnotched specimens and notched specimens with four different notch angles and also different sized specimens. It was found the statistical theory of fracture is not applicable to the fracture of metals after even slight plastic deformation; and that increase in fracture stress with increase in sharpness of the notch is due to increase in the ratio of transverse to longitudinal tensile stress, not to a size effect. 27 ref.

3a-63. Explosives with Lined Cavities. Garrett Birkhoff, Duncan P. MacDougall, Emerson M. Pugh, and Geoffrey Taylor. *Journal of Applied Physics,* v. 19, June 1948, p. 563-582.

Explosives detonated in contact with thick steel plates produce much deeper holes in the steel when there is a cavity in the explosive in contact with the plate. The mathematical theory of this phenomenon. The process is separated into two phases: first, formation of part of the metal liner into a long thin jet traveling longitudinally at very high velocities and, second, the forcing aside of the target material by the extremely high pressures produced upon impact. The theories of both phases are based upon the classical hydrodynamics of perfect fluid which is applicable because the strength of the metals involved can be neglected at the high pressures encountered. 28 ref.

3a-64. Developments in Metals and Alloys for Chemical Plant Equipment. W. Z. Friend. *Chemical Engineering Progress,* v. 44, July 1948, p. 501-510; discussion p. 510.

Recent developments for improving mechanical and physical properties of alloys at elevated temperatures. (Al alloys, Cu and high-Cu alloys, Ni and high-Ni alloys, Fe-Ni alloys, stainless steels, and miscellaneous alloy steels.) 36 ref.

3a-65. The Micro-Mechanism of Fracture. Clarence Zener. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 3-31.

Review of Griffith's contributions to the role of microcracks in brittle materials. Danger in utilizing the Griffith crack concept to interpret fracture phenomena in metals, because of the fundamental difference between them and amorphous materials, on account of the keying action of the grain corners. The initiation of cracks by slip bands and other theories regarding fracture. It was concluded that fracture is initiated by the act of deforma-

tion. Results of an investigation of fracture of armor plates under static and dynamic loading, conducted at Watertown Arsenal during the war. 41 ref.

3a-66. The Effect of Stress State on the Fracture Strength of Metals. John E. Dorn. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 32-50.

Attempts to correlate some of the existing knowledge on fracture of metals in order to ascertain what stress functions dictate the conditions for fracture. Data from various researches showing the effects of different stress and strain histories. 21 ref.

3a-67. Effect of Strain on Fracture. George Sachs. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 51-67.

Effects of prestraining at different temperatures on fracture stress and retained ductility, and of other experimental factors including cyclic loading. It was concluded that the process of fatigue consists of an alternate reduction in ductility by stretching, followed by partial recovery by compression. The gross effect then comprises a gradual reduction in ductility, with increasing number of cycles, until fracturing occurs. 13 ref.

3a-68. A Theory of Static Fatigue for Brittle Solids. Eugene F. Poncelet. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 201-227.

Applies the concept of fracture propagation to explain the mechanism of delayed fracture in brittle solids. The factor of time is introduced into the expression which determines strength of such materials. It is indicated that the old concept of "strength" as "ability to withstand stress", must be abandoned, since brittle solids begin to fracture the instant a stress is applied. It is only because, for stresses substantially below their technical "strength", the static fatigue of brittle solids is of the order of generations, centuries, or even geological epochs that brittle solids have been assumed to possess "ability to withstand stress."

3a-69. Experimental Plans for Study of the Laws Governing Primary Deviation From Elastic Behavior of Materials Under Triaxial Stresses. L. H. Donnell. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 244-245.

Proposed research.

3a-70. Fracture and Hydrostatic Pressure. P. W. Bridgman. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 246-261.

Results of experiments show remarkable increases in ductility for mild steels at high hydrostatic pressures and a progressive change in the character of the fracture. Ductility imparted to completely brittle materials such as copper containing 8% phosphorus, and minerals such as limestone and rock salt. Glass does not acquire ductility, but it is extremely sensitive to surface conditions. Fundamental implications of these results.

3a-71. Fracture and the Structure of Metals. J. H. Hollomon. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 262-274.

Recent publications on the subject. 41 ref.

3a-72. The Speed of Propagation of Fracture Cracks. Edward Saibel. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 275-281.

A theoretical expression for the speed of propagation of a brittle crack in a metal and its dependence on both the hydrostatic component of the stress system and the temperature.

3a-73. Summary of the Seminar. Wendell P. Roop. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 290-311.

Summary of the papers in this volume. Appendices give resumes of Griffith's two papers in which the theory of microcracks was first stated, and explain the mathematical nomenclature of stress and strain.

3a-74. An Application of Dislocation Theory to Fracturing by Fatigue. E. S. Machlin. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 282-289.

Previously abstracted from *National Advisory Committee for Aeronautics, Technical Note* No. 1489, Jan. 1948. See item 3a-10, 1948.

3a-75. Free Volumes of the Metallic Elements at Their Melting Points. S. S. Penner. *Journal of Chemical*

Physics, v. 16, July 1948, p. 745-746.
Have found application in various semi-empirical treatments of physical-chemical phenomena. Calculated for 40 metallic elements.

3a-76. Industrial Metals of High Purity. Albert Portevin. *Metal Progress,* v. 54, July 1948, p. 69-70.
Their production and properties. Variation of a property in terms of percentage impurities (sometimes linear, but often not), beneficial effects of impurities, establishment of reasonable composition specifications, and deoxidation.

3a-77. Properties of Metals at Stratospheric Heights. P. Litherland Teed. *Aircraft Engineering,* v. 20, July 1948, p. 207-214.
Metallurgical problems involved in engineering for flight in the stratosphere. Chemical and physical aspects involved in properties and structures of various metals. Results of mechanical tests employed to learn more of the relationship between stratospheric conditions and metal behaviors. (English text of paper presented before l'Association Francaise des Ingénieurs et Techniciens de l'Aéronautique, Oct. 9, 1947.) 24 ref.

3a-78. Three Design Considerations in Selecting Resistance Alloys. C. P. Marsden. *Electrical Manufacturing,* v. 42, Aug. 1948, p. 116-120, 216, 218.
Heat resistance, specific resistance, and temperature coefficient requirements for electrical conductors employed to generate heat or control current. Offers suggestions for selection of those alloys which will best fit needs of a given application.

3a-79. Permanent-Magnet-Material. J. H. Goss. *Mechanical Engineering,* v. 70, Aug. 1948, p. 671-674.
Available permanent-magnet materials and the groups of alloys into which they fall. Some general considerations regarding permanency. Use of permanent-magnet to a gear drive.

3a-80. Evaluation of the Toughness of the Discs of Steam Turbines. (In Russian.) V. F. Yachenko. *Kotloturbostroenie* (Boiler and Turbine Manufacture), March-April 1948, p. 19-22.
In evaluating the toughness of the disks of steam turbines, the method of double calculation is applied first, using the influence of the "strain" of the rim and connections and strain in the disk; the method of triple calculation introduces the rim coefficient. 19 ref.

3a-81. New Alloy Has Improved Electrical Resistance Properties. *Materials & Methods,* v. 28, Aug. 1948, p. 62-63.
Alloy, called "Evanohm", and its use in manufacture of resistors.

3a-82. Bearing Metals. H. R. Clauser. *Materials & Methods,* v. 28, Aug. 1948, p. 75-86.
Requirements of sleeve bearing materials, and properties and characteristics of the many different bearing metals. Advice on selecting the proper bearing metal for a particular application.

3a-83. Cemented Carbides. E. M. Trent. *British Science News,* v. 1, No. 10, 1948, p. 14-17.
A number of the carbides have been prepared as separate substances. These substances have simple and definite compositions, high electrical and thermal conductivity and a metallic luster, together with very high hardness and little or no plasticity at room temperature.

3a-84. Studies on Some Metal Electrodes. Part I. Oxide-Film Formation on Copper, and the Evaluation of the Standard Electrode Potential of the Metal. Part II. The Behavior of the Copper Electrode in Dilute Copper Sulphate Solutions. A. Riad Tourky and S. E. S. El Wakkad. **Part III. Does the Antimony Electrode Behave Simply as a Metal-Metal Oxide Electrode in Air? Part IV. The Behavior of the Antimony Electrode out of Contact with Air. Part V. The Amphoteric Properties of Antimony Tri- and Pent-oxide.** A. Riad Tourky and A. A. Mousa. *Journal of the Chemical Society,* June 1948, p. 740-763.
Experimental procedures and resultant data for above studies.

3a-85. Further Experiments on the Adhesion of Tin-Base Bearing Alloys. P. G. Forrester and L. T. Greenfield. *Journal of the Institute of Metals,* v. 74, July 1948, p. 525-536.
The nature and properties of the bond between tin-rich alloys and various backing materials were examined by microscopical and mechanical methods, particular attention being paid to the effects of intermetallic compounds at the bond. Embrittlement by Cu_6Sn_5 can largely be avoided by centrifugal casting. Residual Ni and Cr in the steel have no significant effect on bond strength. The bond obtained with tin bronze, phosphor bronze, or gun-metal is of the same order of strength, under static loads, as is obtained with steel. The presence of Cu_6Sn_5 results in some brittleness, but this can largely be avoided by reducing the temperature and time of tinning and lining. Good adhesion can also be obtained on alu-

minum after suitable preparation. 13 ref.

3a-86. The Theory of the Galvanomagnetic and Thermomagnetic Effects in Metals. E. H. Sondheimer. *Proceedings of the Royal Society,* ser. A, v. 193, July 31, 1948, p. 484-512.

Effect of a magnetic field on the thermo-electric power of a metal containing two overlapping energy bands of normal form. Exact solutions of the transport equation are obtained for the cases of high temperature, low temperature, and very strong magnetic field, and it is shown that the formulas can be generalized to give approximate expressions for all temperatures and all fields. The transverse galvano and thermomagnetic effects, and formulas which hold for free electrons which are generalized so as to be approximately valid for all temperatures. 22 ref.

3a-87. Production Data Sheet. *Production Engineering & Management,* v. 22, Sept. 1948, p. 73.

Compositions of eight stainless steels and comparative properties of the stainless steels and carbon steel, Ni, Cu, Al, Mg, and Be.

3a-88. Special Magnetic Alloys and Applications. G. W. Elmen and E. A. Gaugler. *Electrical Engineering,* v. 67, Sept. 1948, p. 843-845. A condensation.

Superior operating characteristics may be obtained in contact rectifiers and magnetic amplifiers by the use of alloys having rectangular hysteresis loops. Such loops may be produced by drastic cold rolling and final special annealing, or by heat treating in a magnetic field.

3a-89. Neuzeitliche Gleitlagerwerkstoffe und ihre Verwendung. (Modern Bearing Metals and Their Applications.) O. H. Hummel. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 427-431.

This survey is based on analysis of results of 2448 experiments made over a 4-yr. period. Results are summarized in a table which permits selection of the proper metal for any given load.

3a-90. Influence de la constitution physico-chimique des alliages métalliques sur leurs propriétés élastiques. (Influence of Physicochemical Constitution of Alloys on Their Elastic Properties.) Robert Cabarat, Léon Guillet. and René Le Roux. *Comptes Rendus,* v. 226, April 26, 1948, p. 1374-1376.

The above was investigated by a dynamic method using frequencies of 10,000 to 50,000 cycles per sec., thus causing only small deformations and avoiding the temporary or permanent modifications resulting from mechanical testing. Data for Al and Cu alloys.

3a-91. Experiences concernant l'homogénéité élastique des métaux. (Elastic Homogeneity of Metals.) Constantin Salceanu and Marium Borneas. *Comptes Rendus,* v. 226, May 3, 1948, p. 1422-1424.

Influence of tension over the period of oscillation of a torsional pendulum, variation of the plasticity of the metal threads with the amplitude of oscillation having been previously established. Method and apparatus used and results.

3a-92. Sur une méthode d'étude de la texture magnétique. (Concerning a Method for Study of Magnetic Structure.) Paul Abadie and Israel Epelboim. *Comptes Rendus,* v. 226, May 24, 1948, p. 1706-1708.

Results of use of the method of magnetic spectra for determination of spin orientation of carbonyl iron powder, cold-worked iron, and permalloy. Effects of different degrees of electrolytic polishing on the magnetic structure of a permalloy containing 76% Ni.

3a-93. Influence de l'aimantation sur le pouvoir thermo-électrique des milieux ferromagnétiques. (Influence of Magnetization on the Thermo-Electric Force of Ferromagnetic Media.) Jean Bouchard. *Comptes Rendus,* v. 226, May 24, 1948, p. 1708-1710.

Influence on different ferromagnetic materials such as Ni, Cu, and Al alloys; Fe; steels, and ferronickels. The theory of the observed phenomena.

3a-94. Nouvelle méthode pour la mesure de la viscosité des métaux. (A New Method for Determination of the Viscosity of Metals.) Constantin Salceanu. *Comptes Rendus,* v. 226, May 31, 1948, p. 1798-1800.

Modification of a previously described method, based on the determination of the logarithmic decrement of the oscillations of a torsional pendulum. Comparative data for Al, Fe, steel, Pb, Ag, Ni, Cu, Pt, and W.

3a-95. Properties of Metallic Surfaces. R. M. Burns. *Journal of the Electrochemical Society,* v. 94, Aug. 1948, p. 14N-16N.

Introductory address before Pittsburgh International Conference on Surface Reactions, Pittsburgh, June 7, 1948. Lubrication and wear, corrosion, oxidation and tarnishing, and catalysis.

3a-96. Some Properties of a Mechanical Model of Plasticity. H. F. Bohnenblust and Pol Duwez. *Journal of Applied Mechanics,* v. 15 *(Transactions*

of the American Society of Mechanical Engineers, v. 70), Sept. 1948, p. 222-225.

An analytical expression for the stress-strain curve and the hysteresis curve of a metal in the plastic range can be deduced from a model. A further analysis of the model leads to the computation of the change in potential energy of the metal due to work hardening.

3a-97. The Stress-Strain Laws of the Mathematical Theory of Plasticity—A Survey of Recent Progress. William Prager. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 226-233.

Typical stress-strain laws of flow and deformation types with particular reference to the conditions of continuity and uniqueness which these laws must fulfill if they are to make sense physically. Alternative forms of some of these laws, and conditions under which different laws yield identical results. How these laws may be generalized so as to fit test data more readily. Methods of integration and the use of variational principles. 50 ref.

3a-98. Stress-Strain Relations for Finite Elastoplastic Deformations. J. E. Dorn and A. J. Latter. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 234-236.

Certain difficulties are involved in adapting known methods for describing finite strains to stress-strain analyses in elastoplastic materials. A mathematical analysis which attempts to surmount these difficulties and which is an extension of methods originally described to include elastic as well as plastic deformations. 14 ref.

3a-99. A Generalized Deformation Law. E. A. Davis. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers, v. 70),* Sept. 1948, p. 237-240.

According to Hooke's law, the magnitude of infinitesimal elastic strains depends upon two independent constants. Equations are developed which express the magnitude and the distribution of the strains in terms of two independent functions of the stresses. The equations are easily adaptable to the relations between the strain rates and the stresses in combined stress-creep tests. The author believes that two independent functions are necessary and that behavior under a state of combined stress cannot be predicted from data obtained in pure-tension tests.

3a-100. The General Proof of the Principle of Maximum Plastic Resistance. A. H. Philippidis. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 241-242.

A mathematical development.

3a-101. The Propagation of Plasticity in Uniaxial Compression. M. P. White and LeVan Griffis. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 256-260.

Results of a theoretical investigation of the mechanism of uniaxial compression impact on elastic-plastic materials. It was concluded that four different kinds of behavior can occur, depending upon the impact velocity. Beginning with low velocities, behavior is first similar to that found in tension. Within the next range, stress and strain are propagated as a shock-type wave; at higher velocities "flowing" deformation occurs; finally, at velocities greater than the speed of an elastic wave, behavior is essentially that of a fluid.

3a-102. The Interaction of Discontinuity Surfaces in Plastic Fields of Stress. Alice Winzer and G. F. Carrier. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 261-264.

A fundamental solution for problems associated with discontinuity surfaces in the field of stress has been developed by W. Prager, but its accuracy has not been established under all conditions. Results of a study of the above limited case.

3a-103. Proton Stopping Power of Solid Beryllium. C. B. Madsen and P. Venkateswarlu. *Physical Review,* ser. 2, v. 74, Sept. 15, 1948, p. 648-649.

The energy loss of protons penetrating beryllium foils of different thicknesses was determined as a function of the proton energy by measuring the shift of those potentials at which a thin aluminum target gives resonance radiation. The experimental points fit within $\pm 2\%$ a theoretical curve corresponding to an average ionization energy of 64 ± 5 ev., which is in agreement with a recent theory for the stopping power of metals.

3a-104. The Spectral Emissivity of Iron and Cobalt. H. B. Wahlin and Harry W. Knop, Jr. *Physical Review,* ser. 2, v. 74, Sept. 15, 1948, p. 687-689.

The spectral emissivity of iron and cobalt was determined as a function of the temperature. Sharp, definite changes were observed in iron at the A_3 and A_4 point and at the Curie point for cobalt.

3a-105. Hall and Kerr Effects at Microwave Frequencies. S. P. Cooke. *Physical Review,* ser. 2, v. 74, Sept. 15, 1948, p. 701-702.

Apparatus for observation of the above, and certain qualitative results for Bi, Fe, Ni, Permalloy (45% Ni), Moly-Permalloy (4% Mo, 79% Ni), Kovar, and various other metals.

3a-106. Wear of Contact Surfaces of Bearings. (In Russian.) V. S. Shchedrov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, April 1948, p. 525-528.

Theoretical analysis.

3a-107. Statistical Rate Theory of Metals. I. Mechanism of Flow and Application to Tensile Properties. Jay W. Fredrickson and Henry Eyring. *Metals Technology,* v. 15, Aug. 1948, T.P. 2423, 33 pages.

A mechanism for deformation of metals in tension. The proposed model and theory explain strain hardening and the effects of temperature and strain rate on stress-strain relationships. It does not account for the occurrence of "blue brittleness" in mild steel, but indicates a change of flow mechanism that was assumed to be an entropy effect occurring in the spring modulus. 41 ref.

3a-108. The Optical Properties of Ni, Co, Fe, Mn, and Cd. F. Bueche. *Journal of the Optical Society of America,* v. 38, Sept. 1948, p. 806-810.

The reflectivities of the above evaporated metal films were measured at five angles of incidence in the visible and near infrared regions. From these data, di-electric constants and conductivities were found by the method of Collins and Bock. A technique for obtaining smooth evaporated cadmium mirrors.

3a-109. Sheet Metals for High Temperature Service. P. A. Haythorne. *Iron Age,* v. 162, Sept. 23, 1948, p. 89-95.

Results of experimental investigation prompted by frequently encountered warpage, buckling, and ultimate failure of metals currently being used in such assemblies as jet exhaust stacks, tail cones, combustion chambers, and exhaust manifolds. The effects of repeated flame impingement on common high-temperature alloys and composite (clad) materials.

3a-110. Mechanical Properties, Including Fatigue, of Aircraft Alloys at Very Low Temperatures. J. L. Zambrow and M. G. Fontana. *American Society for Metals, Preprint* No. 19, 1948, 32 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 480-510; discussion, p. 510-518.

Al and Al alloys, an Mg alloy, low alloy steels, 18-8S stainless steel, Stainless "W", an 8½% Ni steel, and Al bronze were subjected to mechanical tests from room temperature to −423° F. Results of the following are reported: fatigue tests at 25, −78 and −196° C.; impact tests at 25, −78, −127, −192, and −253° C.; hardness tests at 25, −78, and −192° C.; and tensile tests at 25, −78 and −196° C. Equipment, techniques, and precautions.

3a-111. Creep of Metals and Recrystallization. E. N. Da C. Andrade. *Nature,* v. 162, Sept. 11, 1948, p. 410.

Results of some experiments on creep of pure lead which show that recrystallization during creep has a fundamental effect upon the form of the creep curves. This metal, although normally stable at atmospheric temperature, recrystallizes under stress. Possibility of an analogous explanation of the creep behavior of other metals.

3a-112. Creep of Metals Subjected to Compression Stress. A. H. Sully, G. N. Cale, and G. Willoughby. *Nature,* v. 162, Sept. 11, 1948, p. 411-412.

Results of some creep tests under constant compression load on creep-resistant Cr-Ni alloys. Primary, secondary, and tertiary creep were observed, as in the case of tension creep testing. Suggests that, in both tension and in compression, tertiary creep is initiated by atomic rearrangement in the most heavily strained zones adjacent to the crystal boundaries, the onset of which may be determined by the amount of strain which the specimen has undergone.

3a-113. Basic Principles for Development of Heat-Resistant Alloys. (In Russian.) K. A. Osipov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 60, June 21, 1948, p. 1535-1538.

A new method for prediction of the heat resistance of alloys. Data obtained from curves of density of the electronic states and characteristic of each component give clues for such predictions.

3a-114. Relationship Between Melting Points and Resistance to High Temperatures of Alloys. (In Russian.) K. A. Osipov. *Doklady Akademii Nauk SSSR* (reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 1, 1948, p. 71-74.

Attempts to establish relationship for a series of binary alloys (Fe-Cr,

Fe-Ni, Co-Ni, and Mn-Ni). The method of investigation.

3a-115. Sur une nouvelle méthode de détermination de la dissipation d'énergie par frottement interne dans les corps solides. (A New Method for Determination of Energy Dissipation by Internal Friction in Solids.) Paul Le Rolland. *Comptes Rendus,* v. 227, July 5, 1948, p. 37-39.

A method based on determination of the capacity of the materials for absorption of artificially produced vibrations. Fundamentals of the methods. Its advantage consists in its applicability to specimens of any shape such as wires, rods, bars, and plates.

3a-116. Vliv trhlin na povrchu krystalu na mechanické vlastnosti zavisejui na strukture. (The Influence of Surface Cracks on the Structure Sensitive Properties of Metal Crystals.) A. Bichler. *Hutnické Listy* (Metallurgical Topics), v. 3, Aug. 1948, p. 236-240.

According to theoretical considerations, the strength of metals should exceed the real strength by about a thousand times. How far physical metallurgy has been able to explain this fact by theories based on the existence of cracks.

3a-117. A Theory of Transient Creep in Metals. C. L. Smith. *Proceedings of the Physical Society,* v. 61, Sept. 1, 1948, p. 201-205.

A new approach to the theory and a relationship is deduced, connecting the creep strain, the absolute temperature, and the time. This relationship is compared with experimentally obtained curves.

3a-118. The Effect of Thermal-Mechanical History on the Strain Hardening of Metals. J. E. Dorn, A. Goldberg, and T. E. Tietz. *Metals Technology,* v. 15, Sept. 1948, T.P. 2445, 20 pages.

An experimental investigation was conducted using commercially pure aluminum as the principal test material; and high-purity Al, brass, copper, and stainless steel for additional tests. A rack-and-pinion strain gage was used for measuring extensions. Work was done at 292, 260, 194 and 78° K. The data show that flow stress for plastic deformation is dependent on the entire thermal-mechanical history. The mechanical equation of state for 25-O Al gives results deviating as much as 35% from the experimental data. 21 ref.

3a-119. Micro and Macro-Deformations of Metals and Alloys Under Longitudinal Impact Loads. George Welter. *Metallurgia,* v. 38, Sept. 1948, p. 287-292.

Several ferrous and nonferrous materials were tested using gradually increasing longitudinal impact loads. Special shock-proof instruments, permitting measurement of very small permanent deformations, were developed, and three different loading methods were tried to find the one giving the most reliable results. (To be continued.)

3a-120. Chart for Linear Expansion of Materials. *Tool Engineer,* v. 21, Oct. 1948, p. 34-35.

Coefficients of expansion for silver, aluminum, brass, bronze, cast iron, copper, glass, lead, tin, and five types of steel; also expansion table for steel covering dimensions from 1/16 to 5 in. and temperature variations of 5 to 50° F.

3a-121. Heat Transfer by Radiation to Surfaces at Low Temperatures. M. Blackman, Alfred Egerton, and E. V. Truter. *Proceedings of the Royal Society,* ser. A, v. 194, Aug. 12, 1948, p. 147-169.

A study of the transfer of heat between the walls of vacuum vessels. The heat transferred from the outer wall at ordinary temperature to the inner vessel at 90° K. is greater than would be expected from the reflectivity of the inner wall, as estimated from its electrical conductivity. The apparent emissivities at 90° K. of Cu, Ag, Au, Sn, brass, Al, steel, and graphite were determined. 28 ref.

3a-122. Scattering of Ultrasonic Radiation in Polycrystalline Metals. W. Roth. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 901-910.

A method for measuring absorption and velocity of ultrasonic radiation from 5 to 100 Mc. Results of such measurements on polycrystalline Mg and Al show that absorption coefficient varies linearly with frequency and inversely with grain size. Criteria for evaluating the fidelity of pulse transmission in cubic and hexagonal metals, and figures of merit for many such metals. 18 ref.

3a-123. Energy Losses of Sound Waves in Metals Due to Scattering and Diffusion. W. P. Mason and H. J. McSkimin. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 940-946.

Experiments on cubic and hexagonal metals. Two different scattering factors, which depend on anisotropy of the elastic constants, were obtained, one for shear waves and one for longitudinal waves. An approximate formula for diffusion losses was obtained which agrees closely with experimental values.

3a-124. Properties of Chemical Engineering Materials of Construction. *In-*

dustrial and Engineering Chemistry, v. 40, Oct. 1948, p. 1821-1936.

An extensive tabular compilation of data on metallic and nonmetallic materials. Resistance to corrosion by various atmospheres and chemicals is emphasized; but mechanical, electrical, thermal, optical, and other properties are often also given, as well as manufacturing information. Source of data is indicated in each case. 320 ref.

3a-125. Das Ultrarot-Absorptionsvermögen einiger Metalle bei Zimmertemperatur und −183° C. (The Ability of Several Metals to Absorb Infrared Rays at Room Temperature and at −183° C.) Konrad Weiss. *Annalen der Physik,* ser. 6, v. 2, No. 1-2, 1948, p. 1-18.

Drude's formula for the above was checked by a calorimetric method. Results obtained from Cu and Fe were also compared with those of Mott and Zener, which were obtained by a more recent method. The testing device. 19 ref.

3a-126. Sur l'interprétation des anomalies des ferro-magnétiques aux ondes hertziennes. (An Interpretation of Some Ferromagnetic Anomalies With Respect to Hertzian Waves.) Israel Epelboim. *Comptes Rendus,* v. 227, July 19, 1948, p. 185-187.

Anomalies are interpreted on the basis of the true magnetic structures of the metals without use of supplementary hypotheses indicated in the literature. As a result of the work outlined, a new application of metals in radio has been developed (French patents 551,537; 557,905; 557,906; and foreign patents, 1948).

3a-127. Sur la comparaison du fluage et de la relaxation. (Comparison of Creep and Relaxation.) Pierre Laurent and Michel Eudier. *Comptes Rendus,* v. 227, July 26, 1948, p. 259-261.

A new experimental method, applied at room temperature, for the creep of an Al alloy containing 9.7% Cu. Comparison of results with theoretical ones based on the Bolzmann principle showed satisfactory agreement.

3a-128. Fatigue in Metals; A Critical Survey of Recent Research and Theories. Paul Feltham. *Iron and Steel,* v. 21, Oct. 1948, p. 431-436.

80 references.

3a-129. Permanent Magnet Stability. I. R. J. Studders. *Product Engineering,* v. 19, Nov. 1948, p. 129-133.

Effects of structural change and temperature changes on constancy of flux output. Significance of metallurgical and magnetic stability and Curie temperature. Commercial permanent-magnet compositions.

3a-130. Note on "Statistical Aspects of Fracture Problems". Franklin H. Fowler, Jr. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 1092.

Supplements article by Benjamin Epstein, (v. 19, 1948, p. 140). Some theoretical considerations on the nature of the statistical distribution of specimen strengths. In the "bundle of threads" problem the extension rather than the load is fixed. The strength of the bundle is then fixed by the strength of the strongest strand. The desirability of basing statistical strength on the stress level above which a given percentage of specimens would fail rather than basing it on the mode.

3a-131. Magnetic Materials. G. Fitz-Gerald-Lee. *Electronic Engineering,* v. 20, Nov. 1948, p. 351-353.

Properties of the various types.

3a-132. Contribution of Modern Physics to Metallurgy. Frederick Seitz. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 973-987.

Atomic structure, structure, electrical conductivity of metals, differences between metals and nonmetals, source of metallic cohesion, magnetic properties, migration of atoms in metals, and mechanical properties of metal.

3a-133. Bidwell's Intercept Relation and the Thermal Conductivity of Liquid Metals. R. W. Powell. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 995-996.

The relationship advanced by Bidwell and Hogan (v. 18, 1947, p. 776) for thermal conductivity, density, specific heat, and temperature of Al, Sn, Pb, and Zn does not agree with certain experimental data reported by other authors.

3a-134. Different Mechanisms of Plasticity in Metallic Alloys. (In Russian.) A. A. Bochvar, *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 649-653.

A new approach for the explanation of the mechanism of plasticity of alloys at high temperatures, emphasizing the predominant influence of the character of the interaction of the existing phases of the heterogeneous system.

3a-135. The Creep of Metals. E. Orowan. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 45-82, 93-96; discussion, p. 83-92.

From the viewpoint of the phy-

sicist rather than that of the engineer or metallurgist. 50 ref.

3a-136. A Note on the ΔE Effect in Alnico. R. Street and J. C. Woolley. *Proceedings of the Physical Society,* v. 61, Oct. 1948, p. 391-392.

Some experimental results on the change in Young's modulus of a ferromagnetic substance accompanying magnetization, known as the ΔE effect. The results indicate that Alnico rods, and possibly other high coercivity alloys, may be used advantageously in magnetostriction oscillator and filter circuits.

3a-137. A Review of Magnetic Materials Especially for Communication Systems. R. A. Chegwidden. *Metal Progress,* v. 54, Nov. 1948, p. 704B, 705-714.

Both the high-permeability materials and the alloys used for permanent magnets are included. A data sheet summarizes the typical properties of all the materials discussed. 19 ref.

3a-138. The Emissivity of Iron-Tungsten and Iron-Cobalt Alloys. Harry W. Knop, Jr. *Physical Review,* ser. 2, v. 74, Nov. 15, 1948, p. 1413-1416.

Spectral emissivity at 0.667μ was determined for an 18%-W Fe alloy and a 40%-Fe Co alloy. Changes were detected at the peritectoid and peritectic reaction temperatures for W-Fe and at the A_3 point for Fe-Co. Emissivity changes found at 1044 and 1292° K. in Fe-Co are attributed to the order-disorder transition and the ferro to paramagnetic transformation, respectively. The resistivity of 40%-Fe Co was determined as a function of temperature.

3a-139. Melting-Point Chart. K. H. McPhee. *Electronics,* v. 21, Dec. 1948, p. 118.

Metals, alloys and ceramics commonly used in electron tubes are covered. Critical temperatures in °F. and C.

3a-140. Investigation of Rate Coefficient in Different Types of States of Stress. (In Russian.) L. D. Sokolov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, May 1948, p. 687-696.

Establishes, on the basis of experiments on compressing, stretching, rolling, drawing, pressing, and shearing, with different rates of deformation, that the dependence between the produced stresses and rates is the same for all these types of metal treatment, under the conditions of true equivalence of stresses to deformation. Data for lead, two steels, and aluminum.

3a-141. Corresponding States of Metals. (In Russian.) M. A. Zaikov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 847-856.

The author develops further his theory of corresponding states of materials, which permits interpretation of the properties of all metals by a single curve and a single equation. Data obtained by use of this equation. 11 ref.

3a-142. A Theory of Strength of Metals Based on Their Structures. (In Russian.) N. K. Spitko. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 857-862.

Assumes that the deformation of polycrystals proceeds by deformation of the individual grains. On this basis, a method for averaging of yield points is proposed and validated experimentally for three types of alpha iron, for copper, and for zinc. Influence of structural state of the material.

3a-143. Agreement of Mechanisms of Fracture and Unit (Normal) Strengths of Metals. (In Russian.) E. M. Shevandin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 863-874.

Critically analyzes the theories of Davidenkov, Freedman, Kuntze, and Rebinder. 14 ref.

3a-144. Theory of Elastic-Plastic Deformation and Its Applications. (In Russian.) A. A. Il'yushin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 769-788.

On the basis of theoretical analysis, a very general mathematical expression covering all known and several not yet fully investigated theories of solid bodies under deformation is proposed. Practical application to various states of stress.

3a-145. Concerning Stability of Crystal Lattices. (In Russian.) V. Zhdanov and L. Tikhonova. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 18, June 1948, p. 552-558.

The stability of monoatomic cubic face-centered lattices under unilateral tensile and compressive stresses. The destruction of the lattice is shown to possess different characteristics under tension and under compression stress; that is, its resistance to compression stress is considerably less than to tension.

3a-146. The Problem of the Influence of Rate on Resistance During Plastic Deformation. (In Russian.) D. I. Suyarov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, July 1948, p. 921-924.

Attempts to establish a relationship. Factors affecting it. Graphs show deformation vs. applied force for a Pb-Sb alloy.

3a-147. Studie jednoduchych podvojnych slitin s eutektikem. (A Study of Simple Binary Alloys Containing a Eutectic.) Otto Hajicek. *Hutnioké Listy* (Metallurgical Topics), v. 3, Sept. 1948, p. 265-270.

Results of an analysis of literature data which has resulted in development of a mathematical relationship among composition and melting point of the eutectic, and melting points of the individual components of simple binary alloys.

3a-148. Thermo-Electricity; A Survey of Factors Affecting the Thermo-Electric Power of Metals. D. Hadfield. *Iron and Steel,* v. 21, Nov. 1948, p. 478-482.

The thermoelectric effect gives a simple yet fundamental indication of the condition of metals being affected by chemical and metallographic composition, mechanical and thermal treatment, strain, and magnetization. Application to such problems as the solution of carbon in alpha iron, the nature of dislocations and grain boundaries, and transformation points. 25 ref.

3a-149. Possibilités de remplacement de pieces de fonte malléable par des pieces en alliages légers. (Possibility of Replacement of Malleable Cast-Iron Pieces by Light Alloys.) Gustave Caminade. *Fonderie,* v. 32, Aug. 1948, p. 1284-1285.

Comparative properties of "Tenzaloy"—an Al alloy containing 8.00% Zn, 0.80% Cu, and 0.40% Mg; of A-U5GT—an Al alloy containing 4.2 to 5.0% Cu, 0.17 to 0.35% Ti, not more than 0.35% Fe, and smaller amounts of Zn, Mn, Ni, Sn, etc.; and of several French malleable irons.

3a-150. Study of the Thermoplastic After-Effect in Metals (Anomalous Case of Elastic After-Effect). (In Russian.) Sh. S. Manevich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1106-1116.

Investigates, both theoretically and experimentally, the presence of thermoplastic after-effect, consisting of a change in the value of residual deformation in specimens deformed during heat treatment. It seems that such phenomena depend not only on the chemical composition, but on their structure and mechanical properties. Data for ferrous and non-ferrous metals and alloys.

3a-151. Methods of Investigation of Irregularly Deformed States. (In Russian.) P. O. Pashkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1116-1124.

Critically analyzes existing methods. A new formula based on a previously developed theory of local deformation, permitting solution of this problem. Experimental data for lead prove the validity of the formula.

3a-152. Mechanische Festigkeit als Elektroneneffekt. (Mechanical Strength as an Electron Effect.) G. M. Schwab. *Experientia,* v. 2, March 15, 1946, p. 103-105.

The Brinell hardness of Hume-Rothery alloys is believed to depend on their electron concentration in the same way as does catalytic activation energy and electric resistivity. A wave-mechanical theory of hardness, based on the more or less total completion of Brillouin-zones, is proposed.

3a-153. Beobachtungen an flussigen Kontaktbrucken. (Observations on Liquid "Bridges" Between Electrical Contacts.) I. Gerhard Schrag. *Metallforschung,* v. 2, Jan. 1947, p. 25-28.

At 24 volts and 10 amperes, a liquid bridge was observed between metallic electrical contacts. For iron contacts, the bridge consisted of molten metal; for copper, cobalt, and nickel, it was a molten oxide. The amount of current carried by ions; and the temperature of the bridge of the contact, and the temperature difference between the two contacts.

3a-154. Die Abhängigkeit der ferromagnetischen Eigenschaften von der Temperatur als Grundlage fur metall-physikalische Forschungen. (The Effect of Temperature on Ferromagnetic Properties as a Basis for Research on the Physics of Metals.) Walter Gerlach. *Metallforschung,* v. 2, Sept. 1947, p. 275-280.

Values obtained by various researchers. It is shown that remanence is not dependent on temperature unless accompanied by structural changes, and that the coercive force of all ferro-magnetism above a certain temperature has the same temperature relationship. The effect of demagnetization by heating and application of alternate fields. 15 ref.

3a-155. Anelasticity of Metals. Clarence Zener. *Transactions of the American*

Institute of Mining and Metallurgical Engineers, v. 167, Iron and Steel Division, 1946, p. 155-189; discussion, 189-191.

Previously abstracted from *Metals Technology,* Aug. 1946, TP. 1992. 126 ref. See item 3-169, 1946.

3a-156. Engineering Laminates: Fundamentals Underlying the Problems of Their Inhomogeneity. Walter C. Voss. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 449-482.

3a-157. An Experimental Study of the Propagation of Plastic Deformation Under Conditions of Longitudinal Impact. P. E. Duwez and D. S. Clark. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 502-522; discussion, p. 523-532.

Previously abstracted from preprint. See item 3-215, 1947.

3a-158. Intercrystalline Cohesion and the Stress-Rupture Test. H. H. Bleakney. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 575-589; discussion, p. 590-595.

Previously abstracted from preprint. See item 4-92, 1947.

3a-159. Fatigue Characteristics of Rotating-Beam Versus Rectangular Cantilever Specimens of Steel and Aluminum Alloys. F. B. Fuller and T. T. Oberg. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 665-672; discussion, p. 673-676.

Previously abstracted from preprint. See item 3a-30, 1948.

3a-160. The High-Temperature Fatigue Strength of Several Gas Turbine Alloys. P. R. Toolin and N. L. Mochel. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 677-691; discussion, p. 692-694.

Previously abstracted from preprint. See item 3a-31, 1948.

3b—Ferrous

3b-1. Measurement of Young's Modulus at High Temperatures. M. H. Roberts and J. Northcliffe. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p 345-348.

Measurements were made for various steels from room temperature up to 1000° C. by causing a cylindrical rod of the steel to vibrate transversely with its fundamental frequency. From the frequency and the mass and dimensions of the bar, Young's modulus was calculated. Results show a decrease with increase in temperature.

3b-2. A Comparison of Molds of Standard Composition and of Approximately Ingot Mould Subcommittee Composition. W. L. Kerlie. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 410-415.

A number of ingot molds of two different compositions were examined under carefully controlled conditions. Direct correlations between silicon content and mold life and phosphorus content and mold life were found. For the composition recommended by the Ingot Mould Subcommittee an average mold life of 130 casts can be expected, compared with an average of 100 for the standard composition.

3b-3. Alloys for High Creep Strength. *Product Engineering,* v. 19, Jan. 1948, p. 132-134. Condensed from "High-Creep-Strength Austenitic Gas Turbine Forgings", by D. A. Oliver and G. T. Harris, *Transactions of the Institute of Marine Engineers,* v. 59, no. 5, 1947.

Compositions and mechanical properties of three austenitic gas-turbine steels developed by William Jessop & Sons, Ltd., Sheffield, England. Special methods used in production and testing.

3b-4. Toughness of Forgings. *Product Engineering,* v. 19, Jan. 1948, p. 136-137. Condensed from "Toughness and Strength Beyond Requirements for Normal Service", *Drop Forging Topics,* v. 11, no. 4, 1947.

Stress-strain properties of various materials and test methods used.

3b-5. Brittle Fracture in Mild-Steel Plates. Part I. *Engineering,* v. 164, Dec. 5, 1947, p. 532-534; Dec. 12, 1947, p. 536-537; Dec. 19, 1947, p. 581-583; Dec. 26, 1947, p. 605-606.

Part I (in four installments as indicated above) consists of a condensed presentation of three of the nine papers presented at the Conference on Brittle Fracture in Mild-Steel Plates (used in welded-ship construction), Oct. 1945, Cambridge, England. Much of this work has not previously been published. The first installment (Dec. 5 issue) covers 'The Problem of Brittle Fracture in Ship Structures", by J. F. Baker (17 ref.). The second installment (Dec. 12 and 19) covers "Brittleness in Ship Steel", by J. L. Adam. In the light of 40 years' experience in shipbuilding he speculates on the reasons for recent failures, especially in American ships. Diagrams illustrate the locations and types which have been found in ships constructed with different combinations of welding and riveting. The last two installments cover "Fracture and Notch Brittleness in Ductile Metals", by E. Orowan. (To be continued.)

3b-6. Causes of Low Ductility in Mild Steel. J. F. Baker. *Engineering,* v. 164, Dec. 5, 1947, p. 548-550.

Condensed version of appendix to

the paper, "Problem of Brittle Fracture in Ship Structures" (see 3b-5). Fundamental principles. Charts and diagrams show variations of ductility with temperature and with load. (Presented at Conference on Brittle Fracture in Mild-Steel Plates, Cambridge, Oct 26, 1945.)

3b-7. Acicular Cast Irons. *Engineering,* v. 164, Dec. 19, 1947, p. 596; Dec. 26, 1947, p. 607-608. Condensed from fourth report of the Research Committee of the Institution of Mechanical Engineers on 'High-Duty Cast Irons for General Engineering Purposes: Acicular Cast Irons", by J. G. Pearce.

The effect of heating a pearlitic iron was first determined, then the effects of different alloy additions on the properties of acicular cast iron were studied separately and in various combinations.

3b-8. Sulphuric Resistant Wrought Stainless. *Iron Age,* v. 161, Jan. 15, 1948, p. 83; see also **Sulphuric Resistant Stainless Now Produced in Wrought Forms,** *Steel,* v. 122, Jan. 19, 1948, p. 90, 92.

Properties of new forms of Durimet 20, now available for the first time in bar stock, wire, strip, tubing, and pipe and manufactured by Carpenter Steel Co

3b-9. The Influence of Radial Pressure From a Press Fit. G. W. C. Hirst. *Engineer,* v. 184, Dec. 26, 1947, p. 598-599. Condensed from "The Influence of Radial Pressure From a Press Fit on the Endurance Limit of Axles and Crank Pins".

Previously abstracted from preprint (Presented at Symposium on the Failure of Metals by Fatigue, University of Melbourne, Melbourne, Australia, Dec. 1946.) See 3-41, R.M.L., v. 4, 1947 (*Metals Review,* March 1947).

3b-10. Magnetic Properties of Generator Rotors as Affected by Composition. G. S. Downing, W. E. Jones, and L. E. Osman. *Metal Progress,* v. 53, Jan. 1948, p. 87-90.

How routine data accumulated from a group of 89 large forgings over a period of time can be analyzed to point the way to an improved product. (To be continued.)

3b-11. Abrasion Resistance of Alloy White Cast Iron. Kenneth A. DeLonge. *American Society of Mechanical Engineers, Preprint,* 1947, 14 pages.

Improvement in the engineering properties and service performance of white cast iron when suitably alloyed to change the matrix structure from the usual pearlite to hard martensite. The resulting iron has a hardness range of 550 to 725 Brinell and 25 to 50% greater strength and toughness than the unalloyed material. The increase in its service life is usually in the order of two to three times. Specific applications and comparative performance data.

3b-12. Some Properties of Titanium Steels. L. Northcott and D. McLean. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 492-512.

The effects of up to 6% Ti on the structure and properties of plain carbon steel containing 0.1 to 1.0% C, and four low-alloy steels (Cr, Mo, Mn, Mo, Cr, Ni) were investigated. Vertical sections showing the constitution of the Fe-Ti-C system at constant Ti contents were prepared from the results of microexamination, hardness tests, and thermal analysis. Results of tensile tests at room and at elevated temperatures, in conjunction with hardness tests on quenched and tempered specimens are summarized. Results of other workers on the elimination of quench and strain-age hardening by Ti have been, to a great extent, confirmed. 14 ref.

3b-13. Note on the Temperature Variation of Young's Modulus of Various Steels. F. W. Jones and J. Nortcliffe. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 535-536.

There is a close similarity in the temperature variation of Young's modulus of different ferritic steels. Results for austenitic steels, however, do not show a correspondingly close similarity.

3b-14. Correspondence on the Paper —Abnormal Creep in Carbon Steels. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 579-586.

Correspondence of W. B. Brooks, W. E. Bardgett, and H. W. Kirkby, relative to paper by J. Glen (April 1947 issue). Bardgett's contribution consists of extensive experimental data on effect of treating with Si with no Al additions; effect of treating with Al with no Si additions; and effect of treating with Al in the presence of Si. Author's replies.

3b-15. The Dynamic Yield Strength of Steel at an Intermediate Rate of Loading. A. F. C. Brown and R. Edmonds. *Institution of Mechanical Engineers, Advance Copy,* 1947, 6 pages.

A comparison was made between dynamic and static tensile yield strengths of eight steels varying from mild steel to a heat treated low-alloy steel, by varying the rate of loading during an underwater explosion. Dynamic strength of steels with low static strength was 20 to 30% greater than their static yield strength but, for the stronger

steels, the increase was less, being negligible for the heat treated low-alloy steel. This shows that any increase in strength under the dynamic loading considered is too small to be of importance in design.

3b-16. The Tensile Yield Strength of Certain Steels Under Suddenly Applied Loads. F. V. Warnock and J. B. Brennan. *Institution of Mechanical Engineers, Advance Copy,* 1947, 12 pages.

Dynamic tensile yield stresses were determined for eight steels, including one mild, two plain carbon, two C-Mn, one heat treated alloy, and two cast steels. The loads were applied by an impact machine of the falling-weight type. Electrical-resistance strain gages were used to record the loads. Comparison with static values reveals an increase in yield stress of 21 to 36% for the carbon steels under dynamic loading. The annealed cast steels behave in a similar manner but the heat treated alloy steel showed no appreciable increase with increase in rate of loading. A theory is developed to account for the variation in sensitivity of yield strength to load rate.

3b-17. Influence of Strain Aging on the Fracture Stress of Low-Carbon Steel. D. J. McAdam, Jr., G. W. Geil, D. H. Woodard, and W. D. Jenkins. *Metal Technology,* v. 15, Jan. 1948, T. P. 2318, 11 pages.

Specimens of annealed steels were plastically deformed various amounts at room temperature. Some of the specimens were cooled in liquid air and tested to fracture; others were aged before testing in liquid air and still others were aged, plastically deformed again, and finally tested to fracture in liquid air. With each metal, therefore, three curves were obtained. One represents the influence of plastic deformation alone, one the influence of plastic deformation plus strain aging, and the other represents the influence of plastic deformation of strain-aged metal. 20 ref.

3b-18. Heat Resistant Alloy Castings of the "HH" Type. E. F. Wilson. *Alloy Casting Bulletin,* Dec. 1947, p. 1-9.

The significance of certain specifications and test procedures, and available information on the properties of the "HH" type, which contains 25% Cr and 12% Ni.

3b-19. Properties and Weldability of Ni-Cr-Mo Special Steels. E. Henrion. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 41, 43. Translated and abstracted from *Revue de la Soudure,* v. 2, no. 2, 1946, p. 65-71.

3b-20. The Effect of Combined Stresses on the Transition Temperature for Brittle Fracture. C. W. MacGregor and N. Grossman. *Welding Journal,* v. 27, Jan. 1948, p. 7s-16s.

Bending tests on S.A.E. 1020, S.A.E. 1045 and S.A.E. 4140 steels at different temperatures and at various constant strain rates showed that a single type of notched bar has the same brittle transition temperature at the same effective strain rate as a circular disk freely supported and centrally loaded when constructed from the same material. Also, these tests indicate the feasibility of general correlation of properly notched bars and structures or machine parts for transition to brittle fracture. 10 ref.

3b-21. How to Develop Maximum Strength in Alloy Steel Bolts. G. Sachs. *Steel,* v. 122, Feb. 2, 1948, p. 104-106.

Previously abstracted from *Fasteners,* See item 3-414, R.M.L., v. 4, 1947.

3b-22. Abnormal Creep in Carbon Steel; Effect of Molybdenum. J. Glen. *Alloy Metals Review,* v. 5, Dec. 1947, p. 2-6.

Previously abstracted from *Journal of the Iron and Steel Institute,* April 1947. See item 3-145, R.M.L., v. 4, 1947.

3b-23. Corrosion Resistant Metals for Valves and Seats on Heavy-Duty Engines. A. T. Colwell. *SAE Quarterly Transactions,* v. 2, Jan. 1948, p. 94-103.

Previously abstracted from preprint. See item 3-218, R.M.L., v. 4, 1947. (Presented at S.A.E. Summer Meeting, French Lick, Ind., June 2, 1947.)

3b-24. Intermediate Alloy Steels at Elevated Temperatures. R. F. Miller. *Petroleum Engineer,* v. 19, Jan. 1948, p. 178, 180, 182, 184-186, 188-189.

Requirements for various applications, and data concerning the mechanical properties and elevated temperature corrosion resistance of ten steels most commonly used in the petroleum industry. 19 ref.

3b-25. Notch-Tensile Characteristic of a Partially Austempered, Low-Alloy Steel. G. Sachs, L. J. Ebert, and W. F. Brown. *Metals Technology,* v. 15, Feb. 1948, T. P. 2321, 12 pages.

Results on S.A.E. 5140 chromium steel indicate that the concentric and eccentric (static) notch-bar test may be used to evaluate brittleness occurring on partially austempering a low-alloy steel, while regular tensile testing is unsatisfactory for such specimens. Factors affecting notch properties of this steel, and

effects of time of austempering on properties and structure. Additional tests indicate that very small quantities of intermediate products formed during conventional quenching may cause brittleness of any low-alloy steel in hard tempers.

3b-26. The Effect of Alloying Elements on the Hardness of Steel. L. F. Keeley. *Machinery Lloyd* (Overseas Edition), v. 20, Jan. 17, 1948, p. 68-72.

Effects of carbon; nickel; chromium; chromium plus nickel; molybdenum; manganese; tungsten; vanadium; cobalt; phosphorus; sulphur; lead; silicon; titanium and aluminum.

3b-27. Brittle Fracture in Mild-Steel Plates—II. *Engineering,* v. 165, Jan. 2, 1948, p. 16-18; Jan. 16, 1948, p. 53; Jan. 23, 1948, p. 77-78.

First installment of Part II of the report on the proceedings of the conference held in Cambridge, England, in Oct. 1945, consists of "Fracture of Metals: Some Theoretical Considerations", by N. F. Mott. The present state of the theory for brittle substances is outlined and its application to ductile materials, especially metals, is discussed. Second installment consists of "Fundamental Physical and Metallurgical Aspects of Brittle Steel", by D. E. J. Offord. Some results obtained in the proof-testing of alloy steel armor plate are illustrated and discussed. Third installment consists of "An American Point of View", by E. M. MacCutcheon, who describes some of the experiences of the U. S. Coast Guard and of American shipbuilders. (To be continued.)

3b-28. The Creep Properties of Molybdenum, Chromium-Molybdenum and and Molybdenum-Vanadium Steels. J. Glen. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 37-80.

Variables to be considered in the study of creep; importance of controlling, and where possible, of isolating these variables. Limitations of short-time tests, particularly when estimating the creep characteristics of a new type of steel. Creep tests at different temperatures and stresses were conducted on 0.5% Mo; on 0.8% Cr, 0.5% Mo; and on 0.5% Mo, 0.25% V steels, and the effect of C, Si, Mn, and Al were determined. Effects of various heat treatments were also determined. Rupture tests of up to 58,000 hr. duration were conducted and the mode of failure is discussed. By an extensive series of long-time creep tests, the stress temperature relationships for 0.1% and 0.2% deformation in 100,000 hr. are estimated for the Mo-V steel and suitable short-time tests for checking the quality of such steels are discussed. Results show that the latter steel in normalized and tempered condition has creep and rupture properties much superior to those of the Mo and Cr-Mo steels. 20 ref.

3b-29. La Fatigue des Métaux. (Fatigue of Metals). M. Ros. *Revue de Métallurgie,* v. 44, May-June 1947, p. 125-143.

Nature, mechanism, and causes of fatigue failure, based on an experimental investigation of mild steel specimens.

3b-30. Investigation of the Relaxation Process in Tempered Steel by Use of a Ring-Shaped Test Specimen. (In Russian). D. M. Nakhimov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1222-1227.

In the method described, a wedge is used to expand a split ring. Results indicate that the relaxation process is of much higher intensity in steels of low structural stability.

3b-31. Some Properties of Low Carbon 8½% Nickel Steel. T. N. Armstrong and G. R. Brophy. *International Nickel Co.,* 12 pages.

The increasing use of subzero temperatures in many industries and the advantages of storing gases in the liquefied state, have stimulated much interest in the development of materials resistant to brittle behavior at low temperatures. Such a material should be moderately priced and readily fabricated by the usual methods. These needs resulted in development of the steel whose properties are described. While it was developed primarily for low-temperature service, it is already being adopted for other uses where low temperatures are not involved. Prospective applications. (Presented at National Conference on Petroleum Mechanical Engineering of A.S.M.E., Houston, Texas, Oct. 5-8, 1947.)

3b-32. Acicular Cast Irons. *American Foundryman,* v. 13, Feb. 1948, p. 41-48. Condensed from 4th Report of Research Committee on High-Duty Cast Iron for General Engineering Purposes, Institution of Mechanical Engineers, London, by J. G. Pearce.

Previously abstracted from condensation in *Engineering,* v. 164, Dec. 19, 1947, p. 596; Dec. 26, 1947, p. 607-608. See item 3b-7, Feb. 1948.

3b-33. Cast Iron Offers Combination of Properties Not Found in Other Materials. Nelson G. Meagley. *Materials & Methods,* v. 27, Feb. 1948, p. 83-86.

Engineering properties, working

characteristics, and corrosion resistance to different media.

3b-34. The Behavior of the Lattice of Polycrystalline Iron in Tension. W. A. Wood. *Proceedings of the Royal Society* (Series A), v. 192, Feb. 4, 1948, p. 218-231.

Stress-strain characteristics were investigated for two distinct types of lattice planes in specimens of Swedish iron in tension. Earlier observations that the metallic lattice under stress ceases to conform with Hooke's law when external plastic deformation occurs are confirmed, but deviation differs in the two cases. The elastic range for the (211) spacing appears to be greater than for the (310) spacing. On removal of stress in excess of the "lattice yield", the two types of spacing show a residual strain of opposite sign to the strain under stress, but the magnitude is different.

3b-35. An Appraisal of Hardenability Band Specifications for Alloy Steel. D. H. Ruhnke. *Yearbook of the American Iron and Steel Institute,* 1947, p. 580-590; discussion, p. 591-596.

Results of heats made on the basis of hardenability tests and reported to the Alloy Technical Committee since the introduction of H-bands in July, 1944. (Presented at A.I.S.I. meeting, New York, May 21-22, 1947.)

3b-36. Occurrence of Intergranular Fracture in Cast Steels. C. H. Lorig and A. R. Elsea. *American Foundrymen's Assoc., Preprint No.* 47-2, 1947, 14 pages.

Causes of a peculiar smooth undulating fracture in test bars of some cast steel specimens. Several causes of this phenomenon are advanced.

3b-37. Bearing Steels Meet High Quality Standards. E. M. Taussig and C. B. Cobun. *Steel,* v. 122, Feb. 23, 1948, p. 100, 103.

3b-38. Rail Failure Statistics. W. C. Barnes, C. B. Bronson, and L. T. Nuckols. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 383-397.

Data reported by cooperating railroads.

3b-39. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 303-308.

This installment discusses translational magnetism and 180° reversals. (To be continued.)

3b-40. Boron-Treated Steels. *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 345-346, 362; *Steel Processing,* v. 34, March 1948, p. 144-146. Based on Technical Report 1175, National Bureau of Standards.

Extensive experimental program conducted during the war at the National Bureau of Standards under the auspices of the War Metallurgy Committee, National Research Council. Included were a study of interrelationships between boron, carbon, and other alloying constituents on properties of steels made both in the laboratory and commercially; and development of spectrographic and chemical methods for accurate determination of boron in steel.

3b-41. De l'Influence des Facteurs de Fabrication sur les Propriétés Magnétiques des Toles de Transformateurs. (Effect of Manufacturing Factors on the Magnetic Properties of Transformer Plates.) G. Delbart, R. Potaszkin, and M. Sage. *Revue de Métallurgie,* v. 44, July-Aug. 1947, p. 193-209; *Sheet Metal Industries,* v. 25, March 1948, p. 503-508.

The properties of good transformer steels are reviewed and experimental conditions outlined. The greatest possible variations in compositions and methods of treatment, weights of ingots, number of heats, thicknesses of bars, and temperatures were investigated. Results are tabulated and illustrated by photomicrographs.

3b-42. Physical Characteristics of Steel for Tubular Products. A. B. Wilder. *A.S.T.M., Advance Print* AP12, 1947, 19 pages; discussion, p. 15-19.

Results of tests to determine some fundamental factors which influence toughness of steel and are related to steel-making practice. Grain-size determination; high-temperature tension tests; Charpy impact tests at various temperatures of material not cold worked; Izod impact tests of cold worked, tapered bars; and Charpy impact tests of cold worked tension specimens were used to evaluate properties of various types of steel.

3b-43. Service Properties of Manganese-Vanadium Plate Steels. F. F. Franklin. *Vancoram Review,* v. 5, no. 3, 1948, p. 8-9, 21.

3b-44. Vanadium Data Sheet. Vanadium Toolsteels—Part I. T. W. Merrill. *Vancoram Review,* v. 5, no. 3, 1948, p. 10-13.

3b-45. Fatigue Cracking of Retaining Ring Causes Turbine Accident. *Power Generation,* v. 52, March 1948, p. 104, 106, 108.

Accident which caused failure of 2000-kw. turbo-generator in a textile-mill power plant. Failure was

traced to operation of the machine under unbalanced-phase conditions.

3b-46. The Hardness of Steel. L. F. Keeley. *Machinery Lloyd* (Overseas Edition), v. 20, March 13, 1948, p. 68-70.

Various test methods and the effects of different alloying elements on hardenability.

3b-47. Rate of Propagation of Fatigue Cracks in 12-Inch by ¾-Inch Steel Plates With Severe Geometrical Stress-Raisers. Wilbur M. Wilson and James L. Burke. *University of Illinois, Engineering Experiment Station, Bulletin Series* No. 371, (v. 45, no. 10), Sept. 29, 1947, 16 pages.

Test results. Description of test procedure and apparatus.

3b-48. Influence of Columbium on the Properties of Low-Tungsten, High Speed Steel. (In Russian.) N. T. Gudtsov and L. D. Mashtakova. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1629-1637.

A series of steels, compositions of which are tabulated, were investigated. They contained 2.6 to 3.2% W 0 to 3.0% Cb, and 8 to 9% Cr. Addition of Cb decreased the cutting properties and workability to a considerable extent.

3b-49. Phosphorus in Cast Iron. E. Piwowarsky. *Pig Iron Rough Notes*, Winter 1948, p. 2-9. Translated from the German.

Effects of different percentages of phosphorus on structure and mechanical properties. (To be continued.)

3b-50. New Steels. J. G. Morrow. *Canadian Metals & Metallurgical Industries*, v. 11, March 1948, p. 14-15, 34.

A general survey.

3b-51. Modern Engineering Cast Iron. Donald J. Reese. *Metal Progress*, v. 53, April 1948, p. 539-544.

Compositions and structures of the various cast irons, their production, engineering properties, and applications.

3b-52. Which Wrought Stainless Steel? Part II—Fitting the Material to the Part. Stanley P. Watkins and Roland J. Berkol. *Machine Design*, v. 20, April 1948, p. 174-179.

General characteristics and applications of the various types.

3b-53. Brittle Fracture in Mild-Steel Plates—Part II. (Continued.) *Engineering*, v. 165, Feb. 27, 1948, p. 208-210; March 5, 1948, p. 222-223.

Report on conference held at Cambridge, England, Oct. 26, 1945. This installment begins "Brittle Fracture of American Ship Plates", by W. Barr. Four sets of plates from welded ships which had failed were shipped to England for investigation. Results of thorough investigation. One factor noted was lower Mn content than is common British practice. (To be continued.) See Item 3b-27.

3b-54. La Fonte Pour Pieces Minces. (Cast Iron for Thin Pieces.) Joseph Goffart. *Fonderie*, Dec. 1947, p. 960.

Proposes use of the following chemical composition: Si, 2.55 to 2.75%; Mn, 0.5 to 0.6%; P, 1.0 to 1.2%; graphitic C, 3.0 to 3.15%; combined C, 0.4 to 0.5%; and S, 0.05 to 0.07%.

3b-55. Boron-Treated Steels. *Industrial Heating*, v. 15, April 1948, p. 624, 626, 628, 630.

Work on the interrelationship between boron, carbon, and alloying constituents and some of the properties of steels made in the laboratory and a study of the properties of boron-treated steels of selected chemical composition made commercially under predetermined deoxidizing practices at the National Bureau of Standards.

3b-56. Wear Resistance of Gray Iron Diesel Engine Liners. T. E. Eagan. *Foundry*, v. 76, May 1948, p. 134-139, 308-310, 312.

The influence of structure and composition on wear resistance of gray iron. Results of a series of service tests on 90 different liners of seven different analyses.

3b-57. Tensile Properties Vs. Composition of Double Normalized Cast Steel. H. A. Schwartz and W. K. Bock. *American Foundrymen's Association, Preprint No.* 48-1, 1948, 6 pages.

An empirical equation for calculating tensile strength of double-normalized cast steel from its chemical composition. a critical survey of pertinent literature and an evaluation of experimental data. Deals only with double-normalized acid-electric and basic openhearth steels. (Presented at 52nd annual A.F.A. meeting, Philadelphia, May 3-7, 1948.)

3b-58. Wear Tests on Grinding Balls. T. E. Norman and C. M. Loeb, Jr. *Metals Technology*, v. 15, April 1948, T.P. 2319, 31 pages.

Selection of grinding balls is governed principally by: quality (wear resistance, impact resistance, soundness, and the like); sources of supply and delivered cost; and grinding characteristics or efficiency. Data relative to the fundamental nature of ball wear in ball mills. Develop-

ment of a suitable wear test and details of procedure for its use. 11 ref.

3b-59. A Laboratory Evaluation of Some Automotive Cast Irons. Arthur B. Shuck. *American Foundrymen's Association, Preprint No.* 48-11, 1948, 27 pages.

Cupola-melted cast irons were examined to evaluate the effect of composition and cross section on mechanical and thermal properties, wear resistance, and microstructure. Test bars, varying in cross section from ¼ to 1½ sq. in. were cast in green sand molds for each of the irons investigated. Several C-Si-base compositions were melted in each type of alloy to determine the effect of variation in carbon and silicon content. Alloy types were: unalloyed; Ni-Cr; Ni-Mo; Cr-Mo; Mo; and Ni-Cr-Mo.

3b-60. Pearlitic Malleable Irons, Plain and Alloyed. Richard Schneidewind and D. J. Reese. *American Foundrymen's Association, Preprint* No. 48-49, 1948, 20 pages.

A study of mechanical properties. Particular emphasis was placed upon the relationship between design strength and toughness as measured by yield point and elongation, respectively. It was found that, with proper heat treatment, the yield points bore a fixed relationship to elongation. Use of alloys coupled with proper heat treatment made possible a 5000 to 10,000-psi, higher yield point for a given elongation than was possible with unalloyed iron. Oil-quenched irons have a higher yield-to-tensile-strength ratio than the air-quenched irons.

3b-61. Nekolik Poznamek k Barkhausenove Zjevu. (Some Notes on the Barkhausen Effect.) Vaclav Sebesta. *Hutnicke Listy* (Metallurgical Topics), v. 3, Jan. 1948, p. 14-15.

Additional experiments connected with the Barkhausen effect in iron wires coated with nonmagnetic materials and on iron-wire coils. The effect becomes less pronounced with coated wires. Recent experiments have shown that the effect does exist at stronger magnetizations, even though to a small extent.

3b-62. Friction of Solid Films on Steel at High Sliding Velocities. Robert L. Johnson, Douglas Godfrey, and Edmond E. Bisson. *National Advisory Committee for Aeronautics, Technical Note No.* 1578, April 1948, 65 pages.

Results of kinetic friction experiments on steel specimens with thin inorganic-solid films over ranges of sliding velocities between 50 and 8000 ft. per min. and loads from 169 to 1543 g. MoS_2 is very effective in reducing friction, and is very tenacious, and chemically and thermally stable. Fe_3O_4 was beneficial on run surfaces whereas α—Fe_2O_3 was not. With films of type formed by e.p.-lubricant additives, $FeCl_2$ was more effective in reducing friction than was FeS. 19 ref.

3b-63. Tests on Flow and Fracture of Welded and Unwelded Tubes of Steel. L. V. Griffis, G. K. Morikawa, and S. J. Fraenkel. *Welding Journal,* v. 27, April 1948, p. 161s-168s, 208s.

Purpose of experimental study was to determine effects of ratio of the principal stresses (from zero to infinity); presence of welded seams; annealing of welded and unwelded material; and temperature and limit of ductile behavior imposed thereby on plastic flow and mode of fracture. Test procedure, including a traversing mechanism for strain measurements.

3b-64. Causes of Cleavage Fracture in Ship Plate—Tests of Wide Notched Plates. A. Boodberg, H. E. Davis, E. R. Parker, and G. E. Troxell. *Welding Journal,* v. 27, April 1948, p. 186s-199s.

Tests conducted at University of California on flat steel plates containing severe notches in an attempt to determine the possible causes of brittle types of failure in all-welded merchant ships. Notched plates of various widths ranging from 3 to 108 in. were tested over a range of temperatures. Three lots were of semikilled ship-quality steel, one of a nickel alloy, one a fully killed steel, and one a quenched-and-drawn steel. Maximum load, load at formation of first crack, load at failure, energy absorption to maximum load, mode of fracture, reduction in area, and strain distribution were determined. It was found possible to produce, under controlled laboratory conditions, brittle cleavage fractures similar to those found in service. Speed of propagation of cleavage cracks ranged from about 200 to 6000 ft. per sec. Microhardness surveys indicated that considerable local plastic flow may precede rupture by cleavage. (Presented at the 28th Annual Meeting, A.W.S., Chicago, Oct. 19, 1947).

3b-65. Explains Steel Hardenability—What It Is, How It's Used. *SAE Journal,* v. 56, April 1948, p. 40-48, 58. Based on "A Present-Day Approach to the Choice and Application of Automotive Steels", by Walter E. Jominy.

3b-66. Alloying Elements—Effect on Tensile Properties of Malleable Iron.

H. A. Schwartz and W. K. Bock. *American Foundryman,* v. 13, April 1948, p. 130-133.

Experimental results indicate that, as expected, any alloy dissolving in ferrite strengthens it. The effects of successive increments of a given element or of the presence of several elements are not directly additive but decrease as the total alloy increases. The effects of several alloys can, however, probably be approximated by converting all into equivalent amounts of a single alloy. Silicon seems to exert an effect on graphite form which may obscure its effect in the matrix. (Presented at 52nd annual meeting, A.F.A., Philadelphia, May 3-7, 1948.) (Also published as Preprint No. 48-4.)

3b-67. Peeling of Malleable Iron. *Engineering,* v. 165, April 9, 1948, p. 343.

Reviews series of papers and accompanying discussion on above subject, the breaking away of a surface layer under stress, presented at Iron and Steel Institute meeting, London, April 8, 1948.

3b-68. Heat Resisting Steels. L. F. Keeley. *Machinery Lloyd* (Overseas Edition), v. 20, April 10, 1948, p. 68-71.

Composition; scaling and creep; applications.

3b-69. Stabilization of Austenitic Stainless Steel. Samuel J. Rosenberg and John H. Darr. *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 321-338.

Results of a study made of the resistance to intergranular attack of 18% Cr-10% Ni austenitic corrosion resisting steels in 12 different initial conditions. It was found that maximum susceptibility to intergranular attack was developed by sensitizing either 8 or 21 days at 1020° F. The straight carbon austenitic steels were quite vulnerable to attack, although decrease in carbon content decreased the degree of vulnerability. The columbium- and titanium-treated steels were satisfactorily resistant to attack provided the Cb/C or Ti/C ratios were sufficiently high.

3b-70. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 25, April 1948, p. 707-715.

The probabilities of translational magnetization are treated. (To be continued.)

3b-71. The Influence of Manufacturing Factors on the Magnetic Properties of Transformer Sheets. (Continued.) G. Delbart, R. Potaszkin, and M. Sage. *Sheet Metal Industries,* v. 25, May 1948, p. 905-910.

Results of commercial-scale experiments. Carbon contents, grain sizes, and depths of recrystallization at various locations within the bar, for various bar thicknesses, ingot weights, and temperatures at end of rolling. (To be concluded.)

3b-72. Replacing Tungsten With Aluminum in High Speed Steels. Roland Mitsche and Emma M. Onitsch. *Metal Progress,* v. 53, May 1948, p. 690-691.

Austrian research. Replacement was believed to be theoretically feasible on the basis of similar atomic radii. Work was centered on the low-alloy steels containing 4% Cr. Comparative lathe tests on five of these steels showed poor performance for a W-free, Cr-Mo-V steel. The same steel with 0.5% Al gave performance about equal to one containing 1.3% W. Performance of a 2.5%-W steel was also duplicated by one containing 1.3% W plus 0.5% Al.

3b-73. Prewar French Experience With Steel Cartridge Cases. E. Herzog. *Metal Progress,* v. 53, May 1948, p. 679-683.

Successful artillery ammunition was made from nonaging 0.10% C steel strip, quenched from within the Ac_1-Ac_3 range, not tempered nor stress relieved after forming into cartridge cases. Close thickness tolerances and very smooth nondecarburized surfaces were also essential specifications. Representative load-elongation curves obtained after various cold-working and annealing treatments, and after 7 firings.

3b-74. Creep of Steel and Concrete in Relation to Prestressed Concrete. Gustave Magnel. *Journal of the American Concrete Institute,* v. 19 *(Proceedings,* v. 44), Feb. 1948, p. 485-500.

Methods and results of creep tests performed on three different samples of steel wire under constant load and constant length conditions. Preparation of concrete specimens prestressed by use of these same wires.

3b-75. Melting Practice Vs. Properties of Medium-Carbon Low Alloy Cast Steel. *Industrial Heating,* v. 15, May 1948, p. 808, 810.

Condensed from "Some Effects of Melting Practice on Properties of Medium-Carbon Low-Alloy Cast Steel", by J. G. Kura and N. H. Keyser, *A.F.A. Preprint* No. 47-4, 1947.

3b-76. High Frequency Permeability. J. Smidt. *Applied Scientific Research,* v. B1, no. 2, 1948, p. 127-134.

Determines the permeability of iron by observing decrease in wave length measured on a coaxial cable, having an iron wire as inner conductor, compared with the wave length measured on a similar nonferromagnetic system, using the same frequency.

3b-77. The Sorption of Gases on a Plane Surface of Two Stainless Iron-Chromium-Nickel Alloys at 20, −78 and −183°. Marion H. Armbruster. *Journal of the American Chemical Society,* v. 70, May 1948, p. 1734-1742.

Sorption of A, Ne, H_2, N_2, CO, O_2 and CO_2 was measured at pressures up to 0.1 cm. on specially prepared surfaces.

3b-78. Carbon Steels; Abnormal Creep Resulting From Aluminum Additions. J. Glen. *Iron and Steel,* v. 21, May 13, 1948, p. 218-221; discussion p. 269-272.

Five-day creep tests were conducted on low-carbon steels containing 0.4 to 1.5% Mn, 0.01 to 0.15% Si, and up to 0.11% Mo, and with varying amounts of Al up to 3 lb. per ton. Mn, Si, and Mo reduce the creep rate and help to counteract the abnormal creep resulting from Al additions.

3b-79. Creep; Properties of Some Molybdenum-Bearing Steels. J. Glen. *Iron and Steel,* v. 21, May 13, 1948, p. 222-236, discussion p. 269-272.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 37-80. See item 3b-28, 1948.

3b-80. Ingot Molds; A Comparison of Two Different Compositions. W. L. Kerlie. *Iron and Steel,* v. 21, May 13, 1948, p. 249-250; discussion p. 275-276.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 410-415. See item 3b-2, 1948.

3b-81. Wear Tests on Grinding Balls. T. E. Norman and C. M. Loeb. *Mining Technology,* v. 12, May 1948, T.P. 2319, 31 pages.

Previously abstracted from *Metals Technology,* v. 15, April 1948. See item 3b-58, 1948.

3b-82. Influence of Low Temperatures on the Mechanical Properties of 18-8 Chromium-Nickel Steel. D. J. McAdam, G. W. Geil, and Frances Jane Cromwell. *Journal of Research of the National Bureau of Standards,* v. 40, May 1948, p. 375-392.

By means of tension tests of notched and unnotched specimens, an investigation was made between room temperature and —188° C. One of the steels was ferritic; the others were of the metastable austenitic type. Plastic deformation of the latter alloy causes a phase change and thus hardens the alloy. 19 ref.

3b-83. Black-Heart Malleable Iron; Solved and Unsolved Metallurgical Problems. H. A. Schwartz. *American Foundryman,* v. 13, June 1948, p. 46-54.

Tenth Edward Williams Lecture at annual conference of Institute of British Foundrymen, London, June 8-11, 1948. Comprehensive resume and bibliography of fundamental information. 121 ref.

3b-84. The Influence of Manufacturing Factors on The Magnetic Properties of Transformer Sheets. (Concluded.) G. Delbart, R. Potaszkin, and M. Sage. *Sheet Metal Industries,* v. 25, June 1948, p. 1127-1134, 1142.

Results obtained during continued investigation: sheet rolling conditions and results of analysis and micrographic examinations; classification of structures of plates and sheets into types corresponding to uniform recrystallization structures, cold worked recrystallization structures, and fibrous texture; examples of appearance of structure of rolled sheets and annealed sheets; and results of magnetic tests.

3b-85. The Physics of Sheet Steel. G. C. Richer. *Sheet Metal Industries,* v. 25, June 1948, p. 1135-1140.

A working generalization and the Barkhausen effect, qualitative and quantitative determinative variables.

3b-86. Effect of Composition on Low Carbon Austenitic Chromium-Nickel Stainless Steels. George C. Kiefer and Claude M. Sheridan. *American Iron and Steel Institute, Preprint,* 1948, 24 pages.

Corrosion resistance in the fully annealed condition; effect of short and relatively long exposure in the sensitizing range on corrosion resistance and susceptibility to intergranular attack; and mechanical properties.

3b-87. A New Cast Iron. I. Characteristics of the Nodular Graphite Structure. II. Examples of Chemical and Mechanical Properties. J. G. Pearce. *Chemical Age,* v. 58, May 1, 1948, p. 616-618; June 5, 1948, p. 783-784.

Previously abstracted from "Acicular Cast Iron," *Engineering,* v. 165, Dec. 19, 1947, p. 596; Dec. 26, 1947, p. 607-608. See item 3b-7, 1948.

3b-88. Stabilization of Austenitic Stainless Steel. *Steel Processing,* v. 34, June 1948, p. 306-307. A condensation.

Previously abstracted from complete paper by Samuel J. Rosen-

berg and John H. Darr, *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 321-338. See item 3b-69, 1948.

3b-89. Influence of Austenite on the Magnetization Curve of Steel. (In Russian.) V. V. Parfenov and R. I. Yanus. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 161-166.

Magnetization of tempered Cr-Mn steel with austenite contents up to 74% in fields of 20 to 12,000 oersteds. Proportionality between magnetization and final concentration of the ferromagnetic phase exists to a great extent for fields of medium magnetic resistance as well as for high-resistance fields.

3b-90. Alloy Cast Irons; Their Present State of Development. Arthur B. Everest. *Iron and Steel,* v. 21, June 1948, p. 279-284, 288.

Properties of various types, with emphasis on those containing nickel.

3b-91. Improved Properties With Nickel Alloys. Part II. What Nickel Does for Iron and Steel. J. S. Vanick. *Canadian Metals & Metallurgical Industries,* v. 11, June 1948, p. 14-18, 32-33.

Properties of various cast nickel-steels. Examples leading to creation of a specification or particular foundry procedure.

3b-92. Anelastic Properties of Iron. T'ing-Sui Ke. *Metals Technology,* v. 15, June 1948, T.P. 2370, 27 pages.

A number of anelastic effects observed in alpha-iron, and attempts to derive valuable information from a critical study of these effects. The interrelation between various anelastic effects; the experimental methods and apparatus used, and the results; their theoretical interpretation. 30 ref.

3b-93. Stainless Steel Castings. *Machinery Lloyd.* (Overseas Edition), v. 20, June 19, 1948, p. 103.

A metallurgical modification involving the addition of small proportions of special elements to improve machinability.

3b-94. Nickel Steel Resists Damage in Low Temperature Drop Test. *Steel,* v. 122, June 28, 1948, p. 104; **Welded Vessels for −320° F.** *Industry and Welding,* v. 21, July 1948, p. 36.

Vessels of 8½% Ni and stainless steel showed no material damage while a carbon steel vessel was shattered by impact of a weight dropped from a height of 5 ft. onto vessels filled with liquid nitrogen.

3b-95. Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable. Harry A. Schwartz. *Foundry,* v. 76, July 1948, p. 74-75, 216, 218, 220, 222, 224, 226, 228-230, 232, 234, 236, 238.

Previously abstracted from *American Foundryman,* v. 13, June 1948, p. 46-54. See item 3b-83, 1948.

3b-96. Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable. H. A. Schwartz. *Foundry Trade Journal,* v. 84, June 17, 1948, p. 577-584, 586.

Previously abstracted from *American Foundryman,* v. 13, June 1948, p. 46-54. See item 3b-83, 1948.

3b-97. Metallurgical Aspects of Brittle Fracture Phenomena in Mild Steels. I. G. Slater. "Fracturing of Metals," American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 68-81.

A series of factors which cause difficulty when attempting to achieve a fundamental explanation of brittle fracture. The metallurgical characteristics of a series of cases of brittle fracture during service. Principal factors which enhance liability to brittleness in steels, and strain-age phenomena.

3b-98. Fracture Dynamics. George Irwin. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 147-166.

Attempts to clarify recent developments in the dynamics of rapid fracturing of ductile metals by means of a presentation and discussion of results of some Navy research on ductile and brittle fracture of ship-plate steels. Brief mathematical derivation of the velocity of brittle fracture. 14 ref.

3b-99. Plastic Flow and Rupture of Steel at High Hardness Levels. T. A. Read, H. Markus, and J. M. McCaughey. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 228-243.

Stress-strain relations for a medium carbon steel were measured over a range of hardness levels from Rockwell C-40 to 66. The data indicate that stress increases as the nth power of the strain for strains greater than 0.04. The strain hardening exponent n so determined has a minimum value when specimens of these steels are tempered in the neighborhood of 500° F. It is suggested that the low values of energy absorption in the torsion-impact and notched-bar bend tests for heat treated medium and high-carbon steel specimens tempered near 500° F. may result from the low value of the strain-hardening exponent obtained after this tempering treatment. 13 ref.

3b-100. Magnetization Curves for Ferromagnetic Single Crystals. H. Lawton and K. H. Stewart. *Proceedings of the Royal Society,* ser. A, v. 193, April 22, 1948, p. 72-88.

Curves for iron single crystals above the "knee" are derived on the basis of domain theory for the case where the specimen is finite and the field is applied in an arbitrary direction with respect to the crystal axes. It is shown that in many cases the demagnetizing field must be such as to make the field actually acting in the crystal have a direction of symmetry, whatever the direction of the applied field. A method for correcting for the effect of internal strains. 14 ref.

3b-101. Inter-Relation of Hardenability and Isothermal Transformation Data. W. I. Pumphrey and F. W. Jones. *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 137-144.

It has been suggested by previous workers that during continuous cooling the fractional nucleation times are additive in any one transformation range, and that transformation begins when the sum of such times reaches unity. By an extension of this concept, continuous-cooling data were calculated from the isothermal transformation diagram, and the method was used to calculate the hardness along a Jominy bar. For the three steels considered (a hypereutectoid Cr-Mo steel and two hypo-eutectoid Ni steels), the hardenability curves were found to be in reasonable agreement with those determined experimentally. 10 ref.

3b-102. A Magnetic Study of Stainless-Steel Wires. P. T. Hobson, E. S. Chatt, and W. P. Osmond. *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 145-157.

A method developed for examination of very fine single wires for magnetic properties; results of experiments on Fe-Ni-Cr wires and crystal structures of these two-phase cold worked alloys. Typical remanence curves for such wires were analyzed by a modification of the method developed by Richer, and reasonable values for preferred directions of crystal-orientation and domain-orientation were obtained. Possible factors governing the acquisition of irreversible magnetization at higher fields than that giving maximum susceptibility are discussed. Observed changes in magnetic properties after different degrees of heat-treatment are described, and results of analysis of remanence curves and the incidence of irregularities are discussed. Irregularities observed in some wires which were not heat-treated after cold work are described and suggestions concerning the factors leading to their appearance are made. Finally, a tentative equilibrium diagram of the 12%-Cr, 12%-Ni alloy is shown for varying small amounts of carbon. 38 ref.

3b-103. Brittle Fracture in Mild-Steel Plates. II. (Continued.) C. F. Tipper. *Engineering,* v. 165, June 11, 1948, p. 568-571; June 18, 1948, p. 592-595; June 25, 1948. p. 605-607.

Continues report of conference held in Cambridge, England, Oct. 26, 1945. Results of experimental work using high-speed notch tests at low temperatures. Microstructures of the fractured edges of plates which failed in service were examined, and then attempts were made to reproduce these fractures under controlled conditions. The technique of notching and notch profiles.

3b-104. Alloy Iron Castings Show Tensile Strength Almost 60,000 Psi. as Cast. *Inco Magazine,* v. 22, Summer 1948, p. 4-6.

Properties and applications of "Ni-Tensylirons" (new gray-iron alloys containing variable amounts of Ni and Mo—up to 3% for the former and 0.6% for the latter).

3b-105. Tests Below 300° F. Minus Prove Low Temperature Value of New Alloy Steel. *Inco Magazine,* v. 22, Summer 1948, p. 16-19, 26.

8½-Ni welded pressure vessels filled with liquid nitrogen withstood blows of 1500 ft. lbs. on welds, while carbon steel shattered under 1000 ft. lbs.

3b-106. The Growth of High-Speed Steel and Related Alloys During the Past 25 Years. W. R. Hardwick. *Alloy Metals Review,* v. 6, June 1948, p. 2-8.

The development of high-speed steel is reviewed. It is suggested that the three types evolved and standardized have reached some degree of finality as regards composition, although knowledge of heat treatment and application is still growing.

3b-107. Steels For Forging. Part II. The Molybdenum and Vanadium Alloys. Lester F. Spencer. *Steel Processing,* v. 34, July 1948, p. 366-369.

Properties of various compositions.

3b-108. Carburizing and Nitriding Steels. R. F. Johnston. *Steel Processing,* v. 34, July 1948, p. 370-374.

Suitable compositions; and vari-

ous factors involved, such as microstructure. Furnaces required.

3b-109. Galling Tests of Graphitic and Regular Oil Hardening Die Steels. A. F. Sprankle and R. W. Dayton. *Metal Progress,* v. 54, July 1948, p. 65-69.

An Amsler wear-testing machine was used to compare the antigalling characteristics of a conventional die steel of oil hardening, nondeforming type with a wrought graphitic steel both hardened and tempered to C-61 or harder, when rubbing against soft S.A.E. 1015 steel at pressures up to about 100,000 psi., and at various rubbing speeds. The graphitic steel required approximately twice as high a load for galling as the conventional die steel.

3b-110. Stabilization of Austenitic Stainless Steel. Samuel J. Rosenberg and John H. Darr. *Iron Age,* v. 162, July 22, 1948, p. 81. A condensation.

Previously abstracted from *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 321-338. See item 3b-69, 1948.

3b-111. Better Steel Devised for Hubbing. A. L. Pranses. *American Machinist,* v. 92, July 29, 1948, p. 84-87.

Compositions and properties of four types of air-hardening steel and compares them with water-hardening and oil-hardening irons and steels. States that plastic-mold manufacturers can realize substantial savings by adopting air hardening steels which are easier to hub and to heat treat and will retain hardness exceeding Rockwell 50-C at temperatures up to 900° F.

3b-112. Recent Developments Concerning the Properties of Cast Steels. C. W. Briggs. *Transactions of the American Society of Mechanical Engineers,* v. 70, Jan. 1948, p. 37-47.

Property ranges for strength and ductility are given for cast steels receiving different heat treatments. The end-quench hardenability test was used to study a number of carbon and alloy cast steels. It was found that hardenability values of cast steels are similar to those of wrought steels of comparable analyses and grain sizes. Hardenability curves for typical carbon cast steels and hardenability bands for a number of low-alloy cast steels. No one alloy cast steel produces the best impact resistance, for all types of heat treatments, at all testing temperatures.

3b-113. The Role of Meehanite Metal Castings in Engineering Production. C. R. Austin. *Transactions of the American Society of Mechanical Engineers,* v. 70, Feb. 1948, p. 99-109.

The engineering facts concerning high-strength cast irons, their production, and important applications.

3b-114. Temper Brittleness; Some Results of Notched-Bar Impact and Explosion Tests. Fr. Poboril and V. Koselev. *Iron and Steel,* v. 21, June 1948, p. 289-294; July 1948, p. 319-322. Translated from *Hutnické Listy* (Metallurgical Topics), v. 1, Nov. 1946, p. 97-101; Dec. 1946, p. 130-133; Jan. 1947, p. 155-158.

Previously abstracted from original source. See item 3-303, 1947.

3b-115. When and How to Use Gray Iron. T. E. Eagan. *Foundry,* v. 76, Aug. 1948, p. 84-91.

Information on properties, microstructures, and heat treatment of the various types, as an aid to the designer. Includes charts, diagrams, and photomicrographs. Mechanical properties, corrosion resistance, castability, machinability, heat resistance, wear resistance, and various physical properties.

3b-116. Viscosity. E. T. Linacre. *Iron and Steel,* v. 21, July 1948, p. 315-318.

A critical survey of the viscometry of molten iron-carbon alloys; methods of measurement. (To be continued.) 15 ref.

3b-117. Cast Crankshafts. R. J. Love. *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 247-274.

Published information on cast crankshafts and discusses the following aspects: the behavior of cast crankshafts in service and influence of various material properties; cast materials, surface treatments, and special heat-treatments; features of design; and advantages of using cast crankshafts. The results of various tests on cast crankshafts and on the more conventional forged crankshafts are given and indicate that cast crankshafts normally have lower bending fatigue-strengths than forged shafts, the materials used for forged crankshafts having, in general considerably greater tensile strengths than the cast crankshafts. 116 ref.

3b-118. Gray Cast Iron; Relationship of Composition and Properties. R. G. McElwee. *American Foundryman,* v. 14, Aug. 1948, p. 46-49.

Effects of elements considered in a specification. Selection of iron composition for sound casting design.

3b-119. Unappreciated Advantages of Modern Gray Iron. Frederick G. Sefing. *Mechanical Engineering,* v. 70, Aug. 1948, p. 667-670, 674.

Gray iron, its range of properties, engineering applications, limitations, and specifications.

3b-120. Strength Limitations in the Use of SAE 4340 Steel Forgings. E. J. Ripling and L. J. Ebert. *Iron Age,* v. 162, Aug. 5, 1948, p. 88-93.

Utilizing the standard tensile test and the static notched-bar tensile test, for investigation of the suitability of S.A.E. 4340 steel for applications undergoing exposure to various service conditions. Physical-property data for S.A.E. 4340 heat treated commercially, as compared with laboratory (ideal) heat treatment. Quantitative data indicates the effect of tempering temperature on regular tensile properties as well as notch properties when testing at room temperature and at −70° F.

3b-121. Electric Conductivity of Ferro-Magnetic Substances at Low Temperatures. (In Russian.) S. V. Vonsovsky. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 18, Feb. 1948, p. 219-223.

The computation of electrical resistance of ferro-magnetic substances at low temperatures is based on the conductivity of "external" s-electrons and the conditions of magnetization of "inner" d-electrons. Collisions of s-electrons and "ferromagnetism" ("back surge" of d-electrons) during magnetization near saturation, at temperature T_3, causes additional electrical resistance, specifically for ferromagnetic substances. 11 ref.

3b-122. Mechanical Properties and Composition of Castings for the Base Supports of a Hydro-Turbine. (In Russian.) V. I. Smirnov. *Kotloturbostroenie* (Boiler and Turbine Manufacture), March-April 1948, p. 22-24.

Results of investigating mechanical properties and composition of iron castings tempered from 350 and 550° C. Chemical composition and mechanical properties of samples from two base supports which have been long in use.

3b-123. Oxidation Och Avkolning vid Värmning Och Valsning. (Oxidation and Decarburization During Heating and Rolling.) Gunnar Wallquist. *Jernkontorets Annaler,* v. 132, May 1948, p. 123-169.

Investigates existing theory of chemical processes of above. Factors involved, such as chemical composition of steels, concentration of alloy components, temperature and duration of heat treatment or rolling. Influence of different gases on these phenomena. (To be continued.)

3b-124. Nodular Cast Irons. H. Morrogh and J. Grant. *Metallurgia,* v. 38, July 1948, p. 153-160.

A process whereby graphite formed on solidification is in the nodular form. The resulting iron is a very distinct improvement on normal flake graphite irons. The method and the properties attainable.

3b-125. Nickel Alloy Steels. *Machinery,* (London) v. 73, July 15, 1948, p. 59-64.

Their properties and applications.

3b-126. When and How to Use Cast Iron. T. E. Eagan. *Tool Engineer,* v. 11, Aug. 1948, p. 17-20.

This resume of a paper presented at the joint session of the A.S.T.E. and A.F.A., Chicago, Sept. 1947, describes physical characteristics and qualities which make gray iron a dependable engineering material.

3b-127. Phosphorus In Cast Iron (Concluded). E. Piwowarsky. *Pig Iron Rough Notes,* Spring-Summer 1948, p. 18-23. (Translated from the German.)

Data on effect of phosphorus on structure and mechanical properties. 13 ref.

3b-128. Nodular Cast Irons, Their Production and Properties. (Concluded.) H. Morrogh and J. W. Grant. *Foundry Trade Journal,* v. 85, July 29, 1948, p. 105-110.

Data on acicular and martensitic cast irons, and influence of heat treatment on nodular cast irons. Tables of properties and effects.

3b-129. Cracking of Steel in Nitrate Solutions. *Engineer,* v. 186, July 30, 1948, p. 110.

Results of observations and tentative theory for this cracking.

3b-130. Low-Alloy Steels. F. J. Erroll. *Automobile Engineer,* v. 38, Aug. 1948, p. 289-290.

Properties and compositions of several new American materials developed for vehicle construction.

3b-131. Field Tests on Diesel Liners Run Up to 67,000 Hours. T. E. Eagan. *Nickel Topics,* v. 1, Aug. 1948, p. 2-3.

Results of tests on seven alloy compositions. Evidence indicates that the most satisfactory iron as far as wear resistance is concerned in the machinable classes seems to be one which has a pearlitic structure and Type A graphite, alloyed with 1.00 to 1.50% Ni, 0.30 to 0.40% Cr, and 0.25 to 0.35% Mo.

3b-132. Viscosity. (Concluded.) E. T. Linacre. *Iron and Steel,* v. 21, Aug. 1948, p. 363-366.

A critical survey of the viscome-

try of molten iron-carbon alloys. Methods of measurement and tables of data. 43 ref.

3b-133. Strain Aging Criteria. George Sachs. *Iron and Steel,* v. 21, Aug. 1948, p. 385-388.

Susceptibility of low-carbon steels, and results of tests. 72 ref.

3b-134. Refinery Tube Failures; Excessive Temperatures Found Chief Cause. *Petroleum Processing,* v. 3, Sept. 1948, p. 829-831. Based on "Properties of Carbon and Alloy Seamless Steel Tubing for High-Temperature and High-Pressure Service", Technical Bulletin No. 6-E; Babcock & Wilcox Tube Co., Beaver Falls, Pa.

The most common causes of failure, regardless of metal used, were found to be corrosion, scaling, and creep-rupture due to excessive temperature. Results of practical experience in study of tube failures over a 25-yr. period. Properties and applications of a series of steels are concisely stated.

3b-135. Caratteristiche meccaniche e rendimenti pratici di alcuni tipi di acciai rapidi. (Mechanical Properties and Serviceability of Certain High-Speed Steels.) Mario Ongaro. *La Metallurgia Italiana,* v. 40, Jan.-Feb. 1948, p. 19-28.

Hardness, tensile strength at room and various elevated temperatures, and cutting properties of three tool-steel compositions.

3b-136. Interprétation de l'influence d'un champ magnétique sur le frottement intérieur des corps ferromagnétiques. (Interpretation of the Influence of the Magnetic Field on the Internal Friction of Ferromagnetic Substances.) Christian Boulanger. *Comptes Rendus,* v. 226, April 26, 1948, p. 1341-1343.

The phenomenon was investigated for different metals and alloys. Plotted curves and their extrapolations indicate that they may be interpreted satisfactorily by use of the theory of P. Weiss.

3b-137. Chart for Determining Properties of Round Aircraft Tubing. Benjamin Ostlind. *Product Engineering,* v. 19, Sept. 1948, p. 165.

Chart comprises several groups of empirical curves including area of metal in the cross section, weight per lineal ft., D/T ratio, moment of inertia, and radius of gyration.

3b-138. Experimental Studies of Biaxially Stressed Mild Steel in the Plastic Range. S. J. Fraenkel. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 193-200.

Static tests of tubular specimens of medium steel under biaxial stresses and at room temperature made to obtain an experimental check on the so-called "third rule of plastic flow"; to study the absorption of energy as a function of the biaxial-stress ratio; and to determine the effect of the path of loading as symbolized by the strain path. A relation between strain energies absorbed under biaxial and uniaxial stress states up to a common maximum strain is tentatively formulated.

3b-139. Behavior of Steel Under Biaxial Stress as Determined by Tests on Tubes. H. E. Davis and E. R. Parker. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 201-215.

Tests on 12 5¼-in. diameter thin-walled tubes of low-carbon steel subjected to various conditions of biaxial stress. These experiments were a part of a larger investigation on the behavior of ship-plate steel under multiaxial-stress conditions. Ductility under various biaxial stress conditions and at 70 and −138° F. is reported. 13 ref.

3b-140. The Effect of Size and Stored Energy on the Fracture of Tubular Specimens. E. A. Davis. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 216-221.

Results of internal-pressure tests on ship-steel specimens for three sizes of specimens. Both pure internal-pressure and pure circumferential-tension tests were made. The size effect was found to be negligible.

3b-141. Contribution a l'étude du comportement a chaud des aciers austénitiques et austéno-ferritiques dérivant du type 18-8. (Contribution to the Study of the High-Temperature Behavior of Austenitic and Austenitic-Ferritic Steels of the Modified 18-8 Type.) J. Hochmann. *Revue de Métallurgie,* v. 45, May-June 1948, p. 171-179.

Results of investigation indicate that austenitic-ferritic steels are superior as regards mechanical strength and freedom from sudden failure at elevated temperatures (500 to 600° C.). Also recommends use of Ti, Ta, or Cb as alloy additions.

3b-142. Plastic Flow in Anisotropic Sheet Steel. L. R. Jackson, K. F. Smith, and W. T. Lankford. *Metals*

Technology, v. 15, Aug. 1948, T.P. 2440, 15 pages.

Evidence is presented indicating that plastic flow in anisotropic sheet can be described by the shear-strain energy flow theory provided that the anisotropy is properly taken into account. Four steels were subjected to tensile tests and hydraulic-bulge tests.

3b-143. Metallurgical Aspects of Ball Bearing Steels. A. S. Jameson. *Iron Age,* v. 162, Sept. 2, 1948, 72-79; Sept. 9, 1948, p. 81-87; Sept. 16, 1948, p. 88, 92.

A comprehensive study embracing some new alloy combinations as well as the accepted chromium grades. Chemical analysis and its influence on hardenability; nonmetallic inclusions and carbide segregation and their effects on bearing life. Part II presents extensive hardenability data for common as well as new, alloy combinations. The influence of chemical analysis and grain size on hardenability, of austenitizing temperature on grain size, and the relationship between impact strength and grain size. In Part III, bearing-life curves for eight bearing steels, as compared with established E-52100 steel values, are presented. Commercial and metallurgical advantages of substitution of Mo for Cr in bearing-steel compositions. 27 ref.

3b-144. A Study of the Properties of 0.5% Chromium, 0.5% Molybdenum Pipe Steel. R. C. Fitzgerald, A. B. Wilder, G. V. Smith, and A. E. White. *Welding Journal,* v. 27, Sept. 1948, p. 457s-469s.

Mechanical properties, including creep; welding and fabrication characteristics. This steel is essentially similar to 0.5% Mo steel without chromium. The steel, whether deoxidized with Al or not, is resistant to graphitization in butt-welded pipe as well as bead-weld tests lasting up to 15,000 hr. at 1025° F. and 12,000 hr. at 1100° F. Only slight oxidation and little or no embrittlement may be anticipated during use.

3b-145. Notes on Cast Iron. D. R. Kasanof. *Petroleum Refiner,* v. 27, Sept. 1948, sec. 1, p. 124.

Compositions, structures, mechanical properties, and welding procedures.

3b-146. Steels for Antifriction Bearings. H. Diergarten. *Product Engineering,* v. 19, Oct. 1948, p. 121-122. Translated and condensed from *VDI Zeitschrift,* March 21, 1942, p. 167.

Compositions and properties of the various types. Recommendations for heat treatment.

3b-147. Effect of Vanadium on the Properties of Cast Carbon and Carbon-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *American Society for Metals, Preprint.* No. 18, 1948, 37 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 565-600; discussion, p. 600-608.

An investigation was made of carbon, 0.5%-Mo, and 1%-Mo cast steels, in which vanadium ranged from 0 to 0.3% and carbon from 0.05 to 0.3% in each group.

3b-148. Influence of Low Temperatures on the Mechanical Properties of 18-8 Chromium-Nickel Steel. D. J. McAdam, Jr., G. W. Geil, and Frances Jane Cromwell. *American Society for Metals, Preprint* No. 20, 1948, 39 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 609-645; discussion, p. 645-646.

Various steels were studied by means of tension tests of notched and unnotched specimens between room temperature and −306° F. One of the steels was ferritic; the others were of the metastable austenitic type.

3b-149. Transverse Mechanical Properties in Heat Treated Wrought Steel Products. Cyril Wells and Robert F. Mehl. *American Society for Metals, Preprint* No. 23, 1948, 93 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 715-805; discussion, p. 806-818.

Results of studies made of the effect on transverse ductility of size of ingot, forging reduction, yield strength, reheat treatment, and nonmetallic inclusions. Significance of angular fracture and of porosity resulting from deep acid etching in relation to transverse reduction of area quality.

3b-150. Stabilization of Austenitic Stainless Steel. Samuel J. Rosenberg and John H. Darr. *American Society for Metals, Preprint* No. 27, 1948, 29 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1261-1288; discussion, p. 1288-1300.

Previously abstracted from *Jurnal of Research of the National Bureau of Standards,* v. 40. April 1948, p. 321-338. See item 3b-69, 1948.

3b-151. Development of Cleavage Fractures in Mild Steels. A. B. Bagsar. *Transactions of the American Society of Mechanical Engineers,* v. 70, Oct. 1948, p. 751-777; discussion, p. 777-809.

The susceptibility of several types and thicknesses of mild steel of ship-plate and pressure-vessel qualities and of welds to development of cleavage or brittle fractures has

been determined by a new test, termed the "cleavage-tear" test, in which a notched tensile-bend type of sample is used. Effects of notch and coupon geometries, load eccentricity, rate of loading, testing temperature, and of heat treatments. Both brittle and ductile fracture were encountered. Remedial measures for minimizing the damage of cleavage fractures. 29 ref.

3b-152. Causes and Prevention of Drill Pipe and Tool Joint Troubles. H. G. Texter, R. S. Grant, and S. C. Moore. *World Oil,* v. 128, Oct. 1948, p. 79-82, 84, 86.

First of a series of articles first presented before the American Petroleum Institute in 1941. The old text is reprinted in full with revisions. This installment describes various types of failures, of which those caused by fatigue are the most common.

3b-153. Le prove di scorrimento interrotte. Influenza delle interruzioni di sollecitazione e di riscaldamento sulle proprieta di scorrimento. (An Interrupted Creep Test. Influence of Interruption of Heating and of Application of Load on the Process of Creep.) L. Matteoli and B. Andreini. *La Metallurgia Italiana,* v. 39, March-April 1947, p. 71-81.

Effects of simultaneous and of separate brief interruptions of the above were investigated for a steel containing 0.20% C, 0.71% Mn, 0.78% Cr, and 0.27% Mo. A 150-hr. and a 1000-hr. test at 500° C. were applied.

3b-154. Some 1000 F Steam Pipe Materials. Ernest L. Robinson. *American Society for Mechanical Engineers,* Advance copy, Paper 47-A-74, 1947, 10 pages. (Available from General Electric Co.)

Long-time creep and rupture test results on an Mo-V alloy in comparison with low Cr-Mo compositions.

3b-155. Influence of Oxygen Adsorbed on Iron on the Variation of Contact Potentials. (In Russian.) P. Kh. Burshtein and M. D. Surova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 1, 1948, p. 75-78.

Changes in energy of electron emission in the presence of adsorbed oxygen were studied by thermionic methods. Method and apparatus. 12 ref.

3b-156. High Duty Cast Iron in Great Britain. (In English.) D. A. B. Everest. *Metalen,* v. 3, Sept. 1948, p. 12-21.

Recent developments in cast iron and its application in Britain. Great improvements have been achieved and even further improvements are expected.

3b-157. Formation and Properties of Martensite on the Surface of Wire Rope. J. H. Corson. *Wire and Wire Products,* v. 23, Oct. 1948, p. 869-875, 1001.

The reason for service-life variations in wire ropes from the viewpoint of the possible presence of martensite. In service, martensite only occurs in the wire crowns of a rope and is associated with abrasion in which frictional heat is generated. Explanations for the fact that wire ropes with higher carbon content break due to martensite formation, while others do not.

3b-158. Alloying White Cast Iron Increases Abrasion Resistance. Kenneth A. DeLonge. *Engineering and Mining Journal,* v. 149, Oct. 1948, p. 86-89.

Why white alloy cast iron is harder and tougher, and application and performance data of specific interest to mine operators and mill men. Alloyed and unalloyed structures.

3b-159. Welded Alloy Steel Plates Again Found Superior for Locomotive Boilers. *Inco Magazine,* v. 22, Fall 1948, p. 15, 28.

Tests at Baldwin Locomotive Works revealed up to 20,000 psi. greater tensile strength than welded carbon steel for Ni-steel plate containing 2.24% Ni.

3b-160. Important Physical Characteristics of Steel. Chester M. Inman. *Metals Review,* v. 21, Oct. 1948, p. 19, 21, 23.

Second of three articles. Effects of the various alloying elements and selection of steels for specific applications, the various factors involved being discussed in simple terms.

3b-161. Free Cutting Steels. T. C. Du Mond. *Materials & Methods,* v. 28, Oct. 1948, p. 95-102.

Why certain steels are free cutting. The various grades of free-cutting steels, their cutting, joining, heat treatment, and uses.

3b-162. Thermal Resistance of Metal Contacts. W. B. Kouwenhoven and J. H. Potter. *Welding Journal,* v. 27, Oct. 1948, p. 515s-520s.

Thermal resistance of steel-to-steel joints. Effects of pressure, temperature, and surface roughness were explored. An approximate method was developed to estimate the effect of area increase under load. Thermal resistance results are reported at two temperature levels for pressures from 195 to 2955 psi. Tests were also made at constant

pressures and varying temperatures. 13 ref.

3b-163. Iron, Mild Steels, and Low Alloy Steels. R. B. Mears and S. C. Snyder. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1798-1800.
Recently published information which is believed to be of interest to chemical engineers. 30 ref.

3b-164. Stainless Steels and Other Ferrous Alloys. M. H. Brown and W. B. DeLong. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1812-1820.
Reviews literature of the past year under the following headings: passivity and corrosion resistance, structure and mechanical properties, welding, general, high-silicon irons, Ni-Fe alloys, and austenitic Mn steels. 232 ref.

3b-165. Shaft Guide Reactions. J. L. Kerry and H. Hitchen. *Colliery Guardian,* v. 177, Oct. 1, 1948, p. 437-442.
Causes of wire-rope failure. Effects of various designs of guides and pulleys. Results of fatigue tests; inception of cracks and plastic deformation.

3b-166. Anomalous Magnetic Behavior of Nickel-Iron at High Frequencies. A. Wieberdink and R. Kronig. *Nature,* v. 162, Oct. 2, 1948, p. 527-528.
Results of experiments on two concentric Lecher systems, one consisting of a copper wire within a concentric copper conductor and the other a Ni-Fe wire within the same outer conductor. Both systems were coupled to an oscillator and wave lengths of standing waves measured. In a narrow interval, wave lengths on the Ni-Fe wire were considerably larger than those on the copper wire, indicating values of permeability less than unity or even negative.

3b-167. New Steel Features High Strength and High Toughness. Peter Payson and A. E. Nehrenberg. *Iron Age,* v. 162, Oct. 21, 1948, p. 64-71; Oct. 28, 1948, p. 74-80, 152, 154.
A new steel called "HY-Tuf", contains Ni, Mn, Si, and Mo, and possesses low notch sensitivity at relatively high hardness. Notch-impact, notch-tensile, and notch-fatigue properties of this steel are compared with construction steels. Influence of testing and tempering temperatures on mechanical properties. The second installment gives hardenability and data on the properties of the steel treated in sections up to 4-in. round. Microstructures in the hardened and annealed conditions. 16 ref.

3b-168. Stainless Steels—Their Characteristics. James J. Heger. *Steel,* v. 123, Oct. 25, 1948, p. 71-75, 90, 92, 94.
Properties and structures of various stainless-steel compositions.

3b-169. Cold Rolled Low Carbon Sheets vs. Enamel Iron for High Temperature Enamels. Don Beal. *Finish,* v. 5, Nov. 1948, p. 25-28.
Basic differences between the two types, the production of special-analysis steel.

3b-170. High-Silicon Cast Irons Resist High Temperatures. W. H. White and A. R. Elsea. *Foundry,* v. 76, Nov. 1948, p. 68-69, 230.
Investigation was undertaken to verify the claims made for elevated-temperature applications of high-Si cast irons, to develop a technique for their economical production and to improve their characteristics for specific purposes.

3b-171. Plasticity of Steel During Deformation Under Tension and Torsion. (In Russian.) M. V. Vakutovics and F. P. Rybalko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 11, 1948, p. 279-280.
It is shown that the plasticity of polycrystalline materials depends to a great extent on the type of test. Maximum slip under tension is much greater than that under torsion. This fact is believed to be due to irregularities in distribution of deformation along the cylindrical test specimens.

3b-172. Variation de la vitesse de cémentation du fer a la températura du point de Curie. (Variation in the Rate of Sintering of Iron in the Neighborhood of the Curie Point.) Hubert Forestier and Georges Nury. *Comptes Rendus,* v. 227, July 26, 1948, p. 280-282.
The chemical activity of the ferromagnetic oxides was investigated in the neighborhood of the Curie point. A maximum for this activity and its influence on the hardness of iron. Experimental data confirming the theoretical deductions.

3b-173. Fatigue Testing of Spring Steel and the Influence of Surface Defects on the Data Obtained. (In Russian.) L. I. Kukanov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 977-984.
Data from fatigue tests on the above test specimens indicate the influence of surface defects on fatigue strength. Surface treatment, such as sandblasting, shot peening, and polishing, does not always result in the expected improvement of fatigue strength.

3b-174. Fatigue Tests on Crankshaft Steels; Nitriding Effects and Tests on Ni-Cr-Mo and Cr-Mo-V Material. *Automobile Engineer,* v. 38, Oct. 1948, p. 384. Based on paper by P. H. Frith.

3b-175. Properties of Type "CA" Cast Alloys. E. A. Schoefer. *Alloy Casting* Bulletin, Oct. 1948, p. 1-7.

Effects of composition and heat treatment on the mechanical and corrosion resistant properties of cast 12% Cr alloys. Based on research for Alloy Castings Institute by Battelle Memorial Institute.

3b-176. A Guide to Tool Steel Selection. Harold Chambers. *Tool Engineer,* v. 21, Nov. 1948, p. 18-19.

Compositions and hardnesses of the various types.

3b-177. Low-Temperature Properties of 18:8 Steel. *Technical News Bulletin* (National Bureau of Standards), v. 32, Nov. 1948, p. 129-132.

Results obtained by investigation over the past several years. Stress-strain curves and stress-temperature curves for annealed and cold drawn 18-8.

3b-178. Relationship of Section Size, Hardness, and Composition of Gray Cast Iron. R. G. McElwee. *SAE Journal,* v. 56, Nov. 1948, p. 33-35.

Previously abstracted from *American Foundryman,* v. 14, Aug. 1948, p. 46-49. See item 3b-118, 1948.

3b-179. High-Silicon Cast Iron—for High Temperature Service. W. H. White and A. R. Elsea. *Iron Age,* v. 162, Nov. 4, 1948, p. 106-108.

Previously abstracted from *Foundry,* v. 76, Nov. 1948, p. 68-69, 230. See item 3b-170, 1948.

3b-180. Steels and Their Treatment. Part I. Selection. Part II. Conditioning Processes. Norman N. Brown. *Machine Design,* v. 20, Oct. 1948, p. 87-92, 152, 154; Nov. 1948, p. 110-116, 190, 192.

Some of the available steels and their treament, to aid the designer in selecting the most desirable steel and in specifying its subsequent heat treatment. Various heat-treating processes.

3b-181. Fundamentals of Forging Practice. XI and XII. Waldemar Naujoks. *Steel,* v. 123, Oct. 25, 1948, p. 78, 80, 82, 84, 87; Nov 8, 1948, p. 96-100, 126, 129.

Part XI describes uses and properties of the various A.I.S.I. forging steels. Part XII deals with design of parts to be produced by forging. Clarified by simple drawings. (To be continued.)

3b-182. Nodular Cast Irons. H. Morrogh and J. W. Grant. *Foundry,* v. 76, Nov. 1948, p. 90-95, 170, 172, 174, 176, 178, 180, 182, 184-185, 188.

Previously abstracted from *Foundry Trade Journal,* v. 85, July 8, 1948, p. 27-34; July 15, 1948, p. 51-57; July 22, 1948, p. 81-86; July 29, 1948, p. 105-110. (To be concluded.) See item 4b-54. 1948.

3b-183. Some 1000 F. Steam-Pipe Materials. Ernest L. Robinson. *Transaction of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 855-860; discussion, p. 860-865.

Previously abstracted from *American Society for Mechanical Engineers, Advance Paper* 47-A-74, 1947. See item 3b-154, 1948.

3b-184. A Study of the Properties of 0.5 Per Cent Chromium—0.5 Per Cent Molybdenum Pipe Steel. R. C. Fitzgerald, A. B. Wilder, G. V. Smith, and A. E. White. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 867-877.

Previously abstracted from *Welding Journal,* v. 27, Sept. 1948, p. 457s-469s. See item 3b-144, 1948,

3b-185. The Structural Stability of Several Cast Low-Alloy Steels at Elevated Temperatures. V. T. Malcolm and S. Low. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 879-883; discussion, p. 883-884.

Effects of furnace practice on a cast C-Mo-V steel, and of Al, Cr, V, Cu, Ti, Ni, and high Mo on cast C-Mo steel, singly and in various combinations. Results of McQuaid-Ehn, tensile, Jominy hardenability, creep, and weldability tests. Structural stability after various aging cycles. Effect of aging at elevated temperature on static bend bars and V-notch Charpy bars.

3b-186. The Development of a High Creep Strength Austenitic Steel for Gas Turbines. D. A. Oliver and G. T. Harris. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 97-119; discussion, 120-136,

Basic requirements of steels and extensive details concerning development of the British steel known as G.18B.

3b-187. The Magnetic Properties of Sintered Iron and Iron Base Alloys. W. Rostoker. *Metals Technology,* v. 15, Oct. 1948, T.P. 2437, 22 pages.

Shows experimentally that low-porosity alloys having good magnetic properties can be produced by diffusion-alloying of elemental powders. The technique was applied to iron, five alloys of the Fe-Si system, and three alloys each of the Fe-Ni and Fe-Co systems. It was

also demonstrated that the diffusion-alloying technique can be used to produce alloys in suitable forms which are normally impossible to produce because of brittleness. The effect of porosity on magnetic properties was verified experimentally. The homogenization process was studied by an X-ray method and by development of time-temperature-property relationships. Effects of heat treatment and of nitrogen-containing atmospheres. 26 ref.

3b-188. Fatigue Limit of S.A.E. 1095 After Various Heat Treatments. Arthur C. Forsyth and Roland P. Carreker. *Metal Progress,* v. 54, Nov. 1948, p. 683-685.

Determined after three treatments that resulted in a hardness of Rockwell C-53: water quenched and tempered; austempered; and martempered and tempered. The fatigue limit for martempered specimens, 160,000 psi., was considerably higher than for the others, namely, 124,000 and 130,000 psi. S-N diagrams and tension-impact data.

3b-189. Low-Temperature Impact of Annealed and Sensitized 18-8. Erwin H. Schmidt. *Metal Progress,* v. 54, Nov. 1948, p. 698-704.

Austenitic 18-8 alloys of Types 302 and 304 (0.14 and 0.07% C, respectively) were tested in the fully annealed and sensitized conditions. Following cold deformation, Charpy keyhole notch-impact tests were made at room temperature, −150, and −300° F. Results, including those of microscopic examination. Effect of welding on sensitization.

3b-190. Stabilization of Austenitic Stainless Steel. *Industrial Heating,* v. 15, Nov. 1948, p. 1918, 1920, 1928. A condensation.

See abstract of complete article by Samuel J. Rosenberg and John H. Darr, *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 321-328, item 3b-69, 1948.

3b-191. Field Test on Rejected Drill Pipe. A. W. Thompson and H. G. Texter. *Oil and Gas Journal,* v. 47, Nov. 11, 1948, p. 252, 255-256, 259-260.

Results of field tests on strings of drill pipe made up of mill rejects. Inasmuch as only 21 failures occurred in some 46,000 ft. of drilling, none of which was even close to a mill defect, it is believed that seams, pits, scores, (inside or outside) are negligible factors even when such defects are as much as twice API allowable depth. Recommends that greater attention be paid to the care and use of drill pipe than to the question of surface defects and suggests that a hydrostatic test might be better assurance of adequate strength than measurement of surface defects.

3b-192. Graphitic Nitralloy. Victor O. Homerberg. *Iron Age,* v. 162, Nov. 18, 1948, p. 99-101.

An Al-Cr-Mo alloy possessing the properties of nitrided Nitralloy and the added feature of easy machinability. Its composition offers flexibility in that a range of physical properties and combined-carbon: graphitic-carbon ratios can be obtained. Metallurgical characteristics and the correlation between physical properties and microstructure.

3b-193. Properties of Nodular Cast Iron—A Bibliography. *Iron Age,* v. 162, Nov. 25, 1948, p. 83. From *Bulletin of the British Cast Iron Research Association,* July 1948.

Nine recent references are briefly abstracted.

3b-194. Nodular Cast Irons (Concluded.) H. Morrogh and J. W. Grant. *Foundry,* v. 76, Dec. 1948, p. 86-89, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248.

Previously abstracted from *Foundry Trade Journal,* v. 85, July 8, 1948, p. 27-34; July 15, 1948, p. 51-57; July 22, 1948, p. 81-86; July 29, 1948, p. 105-110. See item 3b-128, 1948.

3b-195. Vanadium Data Sheet: Vanadium Tool Steels. Part 2. (Concluded.) T. W. Merrill. *Vancoram Review,* v. 5, no. 4, [1948], p. 10-13.

Compositions, properties, and uses.

3b-196. Proprieta, lavorazione e trattamento termico degli acciai rapidi. (Properties, Cold Working, and Heat Treatment of High Speed Steels.) C. Sapegno and G. Magliano. *La Metallurgia Italiana,* v. 40, July-Aug. 1948, p. 131-141.

The basic characteristics and the influence of cold working and heat treatment on their properties. Six different steels were studied.

3b-197. Low-Temperature Properties of 18-8 Stainless Steel. D. J. McAdam, G. W. Geil, and Frances Jane Cromwell. *Steel Processing,* v. 34, Nov. 1948, p. 592-594. A condensation.

Previously abstracted from *American Society for Metals, Preprint* no. 20, 1948. See item 3b-148, 1948.

3b-198. Study Wear of Diesel Rings and Cylinders. John W. Pennington. *Industry and Power,* v. 55, Dec. 1948, p. 81-83.

Results of recent investigations on 4-cycle Diesel engines. Factors involved are direct mechanical wear, scuffing, "surface disintegration",

abrasion, and corrosion. It is concluded that removal of metal must be intermittent when engine wear rate is low.

3b-199. Low Temperature Properties of 18-8 Chromium-Nickel Steel; A Bureau of Standards Report. *Refrigerating Engineering,* v. 56, Dec. 1948, p. 512-513.

Previously abstracted from *American Society for Metals, Preprint* no. 20, 1948. See item 3b-148, 1948.

3b-200. Some Notes on Fatigue Failures in Aircraft Parts. Norman E. Woldman. *Iron Age,* v. 162, Dec. 9, 1948, p. 97-101.

A number of such failures in steel aircraft parts. Probable causes.

3b-201. Plastic Flow in Cast Iron, at Room and Elevated Temperatures, With Special Reference to Relief of Stress. C. R. Tottle. *Foundry Trade Journal,* v. 85, Nov. 11, 1948, p. 455-460, 463.

The deformation characteristics of cast iron are shown to vary considerably with mode and speed of applications of stress. Total deformation can be increased by slow loading, or aging between successive increments of stress. Incremental stressing changes elastic into plastic deformation in remarkably short periods of time at room temperature, resulting in severely deformed cast-iron bars, normally unobtainable in routine testing. The influence of this "aging" under stress is considered as a form of stress-relief treatment. Shows that temperatures of 450 to 500° C. are necessary for high-duty unalloyed iron, and 550 to 650° C. in the case of alloy additions, where 70% relief or more is desired. Creep curves confirm the tests and enable correlation of time, temperature, and deformation to be made for several compositions and types of high-duty cast iron.

3b-202. Crankshaft Steels. Part I. Effect of Nitriding and Composition on Fatigue Properties. Part II. Nickel-Chromium-Molybdenum and Chromium-Molybdenum-Vanadium Steels. P. H. Frith. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 542-552.

Results of extensive investigations. Photographs show comparative angles of fracture of hollow specimens with oil holes and of solid specimens.

3b-203. Stainless-Steel Wires; A Study of Their Magnetic Properties. P. T. Hobson, E. S. Chatt, and W. P. Osmond. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 555-560.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 145-157. See item 3b-102, 1948.

3b-204. The Microhardness of Carbides in Toolsteels. L. P. Tarasov. *Metal Progress,* v. 54, Dec. 1948, p. 846-847.

In order to clarify the marked resistance to grinding of certain highly alloyed types of toolsteel, Knoop hardness of the carbide particles was measured in three steels and also determined for Alundum, in order to relate hardness of the carbide particles to that of the abrasive used in grinding. Data obtained show that the complex Cr-Fe carbides in high-C, high-Cr steel are about 50% harder than cementite. The complex vanadium carbides are more than twice as hard as cementite and are even slightly harder, on the average, than aluminum oxide. Although silicon carbide is harder than either aluminum oxide or the complex vanadium carbides, extensive experimentation has shown that optimum results can be obtained by proper choice of aluminum oxide wheels and of grinding conditions.

3b-205. Stainless Steel—A Review of Properties. *Welding Journal,* v. 27, Dec. 1948, p. 1056-1057. Reprinted from *Tempil° Topics,* v. 3, no. 9-10.

3b-206. Tests of Spherical Shells in the Plastic Range. Joseph Marin, V. L. Dutton and J. H. Faupel. *Welding Journal,* v. 27, Dec. 1948, p. 593s-607s.

Spherical shell specimens of semi-killed steel were ruptured by pressure at −25 to 80° C. Mechanical properties determined included plastic stress-strain relations, yield, ultimate and fracture strengths, and ductility. A combined state of stress was produced consisting essentially of biaxial stresses of equal magnitude. Comparison of actual with theoretical values shows that for the room-temperature test the generalized St. Venant Theory gives a good approximation to the test results. Yield, true, and nominal ultimate strengths are in best agreement with the shear theory, while nominal and true fracture strengths agree best with the stress theory.

3b-207. Stability of Steels at Elevated Temperatures. A. B. Wilder and J. O. Light. *Welding Journal,* v. 27, Dec. 1948, p. 607s-609s.

Previously abstracted from *American Society for Metals, Preprint* no. 36, 1948. See item 18b-137, 1948.

3b-208. Toughness and Fracture of Hardened Steels. Marcus A. Grossmann. *Transactions of the American Institute of Mining and Metallurgical*

Engineers, v. 167, Iron and Steel Division, 1946, p. 39-79.

Previously abstracted from *Metals Technology,* April 1946, T. P. 2020. 10 ref. See item 3-76, 1946.

3b-209. Elastic After-Effects in Iron Wires from 20° to 550° C. William A. West. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 192-219; discussion, p. 219-221.

Previously abstracted from *Metals Technology,* Aug. 1946, T. P. 1993. See item 3-170, 1946.

3b-210. A Precipitation-Hardening Stainless Steel of the 18 Per Cent Chromium, 8 Per Cent Nickel Type. R. Smith, E. H. Wyche, and W. W. Gorr. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 313-342; discussion, p. 343-345.

Previously abstracted from *Metals Technology,* June 1946, T. P. 2006. 60 ref. See item 3-115, 1946.

3b-211. Determination of Most Efficient Alloy Combinations for Hardenability. H. E. Hostetter. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 643-652; discussion, p. 652-653.

3b-212. The Influence of Titanium on the Hardenability of Steel. G. F. Comstock. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 719-733; discussion, p. 733-734.

Effect depends on heat treatment of the steel, or whether total titanium or acid-soluble titanium is used, and on amount of titanium present relative to the carbon.

3b-213. The Annealability of White Iron in the Manufacture of Malleable Iron. S. W. Palmer. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A64-A84; discussion, p. A84-A86.

Previously abstracted from *Foundry Trade Journal,* v. 83, Oct. 2, 1947, p. 87-94; Oct. 9, 1947, p. 107-113; Oct. 16, 1947, p. 129-135. See item 3-366, 1947. Also appeared as advance copy No. 876.

3b-214. Effect of Copper Addition Contaminants on Mechanical Properties of Gray Cast Iron. K. E. Rose and C. H. Lorig. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 89-100; discussion, p. 100-101.

Also appeared as preprint No. 47-10, 1947 Previously abstracted from *American Foundryman,* v. 11, May 1947, p. 83-93. See item 3-150, 1947.

3b-215. Influence of Selenium on Sulphide Inclusions and Ductility of Cast Steel. Albert P. Gagnebin. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 277-286; discussion, p. 286-287.

Also appeared as preprint 47-41, 1947. Previously abstracted from *American Foundryman,* v. 12, Aug. 1947, p. 43-52. See item 4-119, 1947.

3b-216. Stability of Steels as Affected by Temperature. E. A. Sticha. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 207-210.

3b-217. A Study of the Transition From Shear to Cleavage Fracture in Mild Steel. Harmer E. Davis, Earl R. Parker, and Alexander Boodberg. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 483-499; discussion, p. 500-501.

Previously abstracted from preprint. See item 4b-22, 1948.

3b-218. Physical Characteristics of Steel for Tubular Products. A. B. Wilder. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 596-609; discussion, p. 610-614.

Previously abstracted from preprint. See item 3b-42, 1948.

3b-219. Uber die magnetoelastischen Konstanten einer 25%-igen Eisen-Chrom-Legierung. (The Magneto-Elastic Constants of an Iron Alloy Containing 25% Chromium.) Otto Rudiger. *Metallforschung,* v. 2, Sept. 1947, p. 270-275.

Mathematical principles of the calculations. The orientation of the monocrystals was determined by the Laue X-ray-refraction method and the magnetoelastic constants by measurement of the difference in the magnetostriction between remanence and saturation of differently oriented crystals. 10 ref.

3b-220. Effect of Alloys in Steel on Resistance to Tempering. W. Crafts and J. L. Lamont. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 222-242; discussion, p. 242-243.

Previously abstracted from *Metals Technology,* v. 13, Sept. 1946, TP 2036. See item 3-189, 1946.

3b-221. Boron in Certain Alloy Steels. M. C. Udy and P. C. Rosenthal. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 273-301; discussion, p. 301-302.

Previously abstracted from *Metals Technology,* v. 13, Oct. 1946, TP 2085. See item 3-235, 1946.

3b-222. The Izod Impact Strength of Heat Treated Alloy Steel. W. Crafts and J. L. Lamont. *Transactions of the*

American Institute of Mining and Metallurgical Engineers, v. 172, 1947, p. 303-317; discussion, p. 317-322.

Previously abstracted from *Metals Technology,* v. 14, Feb. 1947, TP 2134. See item 18-53, 1947.

3b-223. Influence of Plastic Deformation, Combined Stresses, and Low Temperatures on the Breaking Stress of Ferritic Steels. D. J. McAdam, Jr., G. W. Geil, and R. W. Mebs. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 323-362.

Previously abstracted from *Metals Technology,* v. 14, Aug. 1947, TP 2220. See item 3-309, 1947.

3b-224. The Effect of Prior Tensile Strain on Fracture. Edward Saibel. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 363-370; discussion, p. 370-373.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2186. See item 3-169, 1947.

3b-225. Anomalous Changes in Tensile Properties of Quenched Iron-Cobalt (35 per cent Co) Alloys. J. K. Stanley. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 374-384; discussion, p. 385.

Previously abstracted from *Metals Technology,* v. 14, Aug. 1947, TP 2221. See item 3-310, 1947.

3b-226. Stress Rupture of Heat-Resisting Alloys as a Rate Process. E. S. Machlin and A. S. Nowick. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 386-399; discussion, p. 399-412.

Previously abstracted from *Metals Technology,* v. 14, Feb. 1947, TP 2137. See item 9-30, 1947.

3c—Nonferrous

3c-1. The Efficiency of Thermoelectric Generators. Part I. Maria Telkes. *Journal of Applied Physics,* v. 18, Dec. 1947, p 1116-1127.

The efficiency of generation of electrical energies by means of available thermocouples is less than 1%. A review of theoretical efficiency calculations shows that higher efficiencies can be attained with materials to which the Wiedemann-Franz-Lorenz relation is applicable, when their thermoelectric power is greater than 200 microvolts per ° C. Some Zn-Sb alloys with added metals approach these conditions and produce an experimental efficiency of over 5% in accordance with theoretical calculations. Lead sulphide with excess lead in combination with Zn-Sb alloy produces an efficiency of 7%. 52 ref.

3c-2. Ni-Span C—New, Age Hardenable, Constant-Modulus Alloy. *Inco,* v. 21, no. 4, 1947, p. 22-23.

Properties and application of Ni-Cr-Ti-Fe measuring and timing equipment. Temperature changes between −50 and 250° F. do not expand, weaken, or soften it.

3c-3. Alloys for Nonferrous Forgings. *American Machinist,* v. 92, Jan. 1, 1948, p. 143.

Properties and compositions of eight copper-base alloys and eight aluminum alloys.

3c-4. Contact Potentials Between Different Liquid Metals. (In Russian.) S. Karpachev and M. Smirnov. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 21, Oct. 1947, p. 1205-1212.

Contact potentials for molten Pb-Sn, Th-Pb, and Th-Sn were determined. 11 ref.

3c-5. The Thermo-Electric Properties and Electrical Conductivity of Bismuth-Selenium Alloys. B. D. Cullity. *Metals Technology,* v. 15, Jan. 1948; T.P. 2313, 8 pages.

Results of an investigation made in an attempt to find a suitable material for use in thermo-electric generators. Effects of a number of addition agents. The binary alloy containing 37% Se was the only one found suitable. It had an efficiency of about 6%, when tested against a Zn-Sb alloy containing addition agents. Use of small amounts of Te improved the properties of the 37% alloys.

3c-6. The Absorption of Na^{24} Gamma-Radiation in Lead, Copper, and Aluminum. David E. Alburger. *Physical Review,* v. 73, Feb. 15, 1948, p. 344-346.
Experimental results.

3c-7. Etude de l'Energie Magnetocristalline des Composés Definis MnBi et Mn_2Sb. (Study of Magnetocrystalline Energy of the Definite Compounds MnBi and Mn_2Sb.) Charles Guillaud. *Journal des Recherches du Centre National de la Recherche Scientifique,* 1946, p. 27-33.

Determination of magnetic properties of monocrystalline Mn_2Sb and MnBi in the range 20° K. to room temperature.

3c-8. Preparation d'Alliages Binaires du Manganese et Détermination de Leur Diagramme en Utilisant Principalement les Proprietés Ferromagnetiques. (Preparation of Binary Alloys From Manganese and Determination of Their Diagram, Using Principally Their Ferromagnetic Properties.)

Charles Guillaud. *Journal des Recherches du Centre National de la Recherche Scientifique, No.* 1, 1947, p. 15-21.

Commercial manganese was purified to 99.99% for use in making alloys for this study. Mn-Sb, Mn-As, Mn-Sn, Mn-Bi alloys were prepared and their Curie points determined.

3c-9. A New Group of Strong, Conductive Copper Alloys. Harold A. Knight. *Materials & Methods,* v. 27, Feb. 1948, p. 76-79.

Properties and applications of Trodaloys, a group developed by General Electric. These and similar alloys are also produced and sold by several other companies under other trade names, including Beraloy, Mallory 100, Ampcoloy, Tuffalloy, Berylcos, Alloy W5. Alloying elements present in some or all of these are Co, Be, Cr, Ag, Ni, and Zr. They have the unusual combination of high strength, high electrical conductivity, high endurance limits, high impact resistance and high service temperatures.

3c-10. Sulphuric Acid Resistant Stainless Steel Now Available in Wrought Form. *Materials & Methods,* v. 27, Feb. 1948, p. 80-82. See also **Corrosion.** Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Feb. 1948, p.87A-88A.

Properties and applications of Carpenter Stainless No. 20 which is a new form of Durimet 20 (available only in cast form). Future availability in sheet and plate form is expected.

3c-11. Blistering of Silver Plating at High Temperature. Carl F. Floe and M. B. Bever. *Metal Progress,* v. 53, Feb. 1948, p. 247-248.

Results of some experiments made to determine the cause of blistering on turbine and jet-engine parts. It was found that blistering required presence of oxygen or of water vapor at 800 and 1200° F. Tests at 1400° F. indicated that heating in nitrogen for a sufficient period removes hydrogen by diffusion, while, on heating in air, oxygen is adsorbed and forms water vapor by reaction with hydrogen. Believes that hydrogen and oxygen embrittlement are misnomers which should be replaced by "water-vapor embrittlement".

3c-12. Quantum Mechanical Calculation of the Heat of Solution and Residual Resistance of Gold in Silver. Kun Huang. *Proceedings of the Physical Society,* v. 60, Feb. 1948, p. 161-175.

An attempt is made to calculate the heat of solution of gold in silver on the basis of the quantum theory of metals. These two metals were chosen because they have the same atomic volume, and therefore are the simplest case. 0.15 ev. per atom was found for the heat of solution, which compares well with the observed value of 0.13 ev. Residual resistance was found to be 0.16 microohm per cm. for 1% solution. The considerable discrepancy as compared with the experimental value 0.38 seems closely connected with similar discrepancies found in other theoretical work on temperature resistances of the noble metals. 10 ref.

3c-13. Silver; A Survey of Its Production, Properties and Engineering Uses. Part III—Properties and Alloys. IV—Applications. (Concluded.) L. B. Hunt. *Metal Industry,* v. 72, Feb. 6, 1948, p. 103-105; Feb. 13, 1948, p. 123-127.

3c-14. Fatigue Characteristics of Some Copper Alloys. H. L. Burghoff and A. I. Blank. *A.S.T.M., Advance Print* AP1, 1947, 18 pages.

Fatigue characteristics of Cu and several Cu alloys, available commermined in rotating-beam fatigue tests. Fatigue properties for more cially in the form of rod, as deterthan one temper.

3c-15. The Creep Characteristics of Copper and Some Copper Alloys at 300, 400, and 500° F. H. L. Burghoff and A. I. Blank. *A.S.T.M., Advance Print* AP2, 1947, 30 pages; discussion p. 30.

Information obtained in a continuing program of creep testing of wrought Cu alloys. Creep data including total creep, creep rates, and relative creep strengths, are shown for four types of Cu and several Cu alloys in annealed and hard-drawn tempers. Tensile properties and notations on microstructure of test materials before and after creep testing are given.

3c-16. Magnesium-Cerium-Zirconium Alloys; Properties at Elevated Temperatures. A. J. Murphy and R. J. M. Payne. Cerium Metals Corp., New York, 1947, 26 pages. Reprinted from *Journal of the Institute of Metals,* v. 73, Nov. 1946, p. 105-127.

Previously abstracted. See item 3-5, R.M.L., v. 4, 1947.

3c-17. Supermalloy. *Bell Laboratories Record,* v. 26, March 1948, p. 111-113.

Development of alloy which has an initial permeability 500 times that of iron.

3c-18. Incipient Superconductivity in Titanium. Robert T. Webber and J. M. Reynolds. *Physical Review,* 2nd Series, v. 73, March 15, 1948, p. 640.

Measurements on Ti wire made

at the Bureau of Standards by reduction of the chloride with Mg at 1000° C. in argon. Resistances were determined from 1.1 to 4.23° K. in presence and absence of magnetic fields of intensities up to 1200 gausses. Incipient superconductivity observed is believed due to an impurity, but possibility of actual superconductivity below 1.1° K. is indicated.

3c-19. Heat Capacity of Low-Melting Metals in the Solid and Molten States. (In Russian.) G. M. Bartenev. *Zhurnal Tekhnickeskoi Fiziki* (Journal of Technical Physics), v. 17, Nov. 1947, p. 1321-1324.

Results of a determination from heating and cooling curves of the heat capacity of Pb and Sn in both states and in the melting-point regions. The phenomenon of anomalous heat capacity of Sn at 166° C.

3c-20. Heat of Fusion of Tin, Lead, and Their Eutectics. (In Russian.) G. M. Bartenev. *Zhurnal Tekhnickeskoi Fiziki* (Journal of Technical Physics), v. 17, Nov. 1947, p. 1325-1330.

A method for determination of heat of fusion from coefficient of heat exchange and its application to the above. Results in connection with establishment of the structure of liquid eutectics.

3c-21. The Variation With Magnetization of Young's Modulus for Cobalt. R. Street. *Proceedings of the Physical Society,* v. 60, March 1948, p. 236-243; discussion, p. 243.

Variation for specimens of annealed and unannealed cobalt was investigated, for field intensities up to about 700 oersteds, by the method of magneto-strictive oscillation. The decrement of longitudinal oscillation in cobalt rods was also measured, and found to be of the order of 10^{-3}. 15 ref.

3c-22. Influence of Stresses on the Hall Effect in Permalloy. (In Russian.) N. M. Genkin. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 17, Dec. 1947, p. 1090-1093.

Results of an investigation of the effects of plastic and elastic deformation. Hall's coefficient is increased by plastic deformation, but is unaffected by elastic deformation.

3c-23. High Frequency Vacuum Breakdown Tests for Copper and Copper-Plated Ceramic Surfaces. Philip C. Bettler. *U. S. Atomic Energy Commission,* MDDC-1695, Feb. 17, 1947, 4 pages.

The teeth of the rotary capacitor for the University of Rochester frequency-modulated cyclotron are to be made of copper-plated ceramic material. Tests were conducted in a vacuum between copper-plated zircon surfaces. For comparison, solid-copper electrodes were also tested. Data were obtained for both outgassed and fresh surfaces. It was found that the copper-plated ceramic gave about the same results as solid copper.

3c-24. The Institute of Metals. *Engineering,* v. 165, April 9, 1948, p. 340-341.

Continues summary of papers presented at annual meeting (March 1948), and accompanying discussion. The Young's Modulus of Some Aluminum Alloys, by N. Dudzinski and others; The Moduli of Aluminum Alloys in Tension and Compression, by S. F. Grover, W. Munro, and B. Chalmers; and Pressure and Creep Tests at Constant Hoop Stress on Lead and Alloy-"E" Pipes, by A. Latin. (To be continued.)

3c-25. Sintered Alnico Permanent Magnets. *Machinery Lloyd* (Overseas Edition), v. 20, April 10, 1948, p. 101-102.

Properties and applications of this alloy of Ni, Co, Al, and Cu which has a greater magnetic energy per unit volume than any other such alloy.

3c-26. Influence of Various Factors on the Creep of Lead. J. Neill Greenwood and J. H. Cole. *Metallurgia,* v. 37, April 1948, p. 285-289.

Results of some long-time creep tests on pure lead, containing 0.009% total impurities; including influences of stress at ordinary temperature, of stress at 50° C., and of superimposed vibratory stresses.

3c-27. Recherches Electrochimiques sur le Tantale. (Electrochemical Research Concerning Tantalum.) M. Haissinsky, A. Coche and M. Cottin. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 44, Oct. 1947, p. 234-241.

Results of a study of electrochemical potentials of tantalum in various acidic and basic media. Variation of potential as a function of pH is charted. Potentials obtained for combinations of Ta. 12 ref.

3c-28. Resistance of Copper Alloys to Hydraulic Pressure. (In Russian.) A. M. Korol'kov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R. Section of Technical Sciences), Jan. 1948, p. 97-101.

Resistance to load decrease on addition of Si or Pb. This decrease is connected with the crystallization of the alloys over a large temperature interval. The most resist-

ant were the aluminum bronzes which crystallize within a small interval. Decrease of resistance is also connected with the phenomenon of disseminated porosity during solidification.

3c-29. Ueber die Dauerstandfestigkeit von Zinklegierungen. (Creep Resistance of Zinc Alloys.) O. H. C. Messner. *Schweizer Archiv fur angewandte Wissenschaft und Technik,* v. 14, March 1948, p. 86-94; April 1948, p. 118-127.

Creep resistance of zinc is very low, but may be increased by proper treatment. Creep strength varies with composition but is much more influenced by methods of fabrication, such as heat treatment and working. No definite relationship between creep strength and grain size or structure was found; nor between short and long-term test results. The most likely cause of creep seemed to be internal slip in the crystals.

3c-30. The Effect of Small Percentages of Silver and Copper on the Creep Characteristics of Extruded Lead. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials, Preprint* No. 25, 1948, 14 pages.

Creep tests on longitudal tension-test specimens taken from a series of Pb-Ag alloys extruded in the form of 0.140-in. pipe and containing various percentages of Cu indicate that Ag up to 0.010% improves creep resistance at stresses of 400 psi. and above.

3c-31. Influence of Small Percentages of Silver on the Tensile Strength of Extruded Lead Sheathing. Howard S. Phelps, Frank Kahn, and William P. Magee. *American Society for Testing Materials, Preprint* No. 26, 1948, 10 pages.

Stress-rupture tests were made on a series of extruded-cable sheathing pipe samples of substantially pure lead to which various percentages up to 0.018% of silver were added. Extrapolation of results indicates probability of improved stress-rupture and creep characteristics at operating stresses when silver up to approximately 0.010% is added. Undesirable results are indicated for addition of silver alone in excess of 0.010%.

3c-32. Effects of Nickel, Zinc and Lead Additions to 5% Tin Bronze. Ralph L. Fox, Jr. *Foundry,* v. 26, June 1948, p. 102-103, 258, 260, 262.

Experimental results.

3c-33. Untersuchungen an Antimon-Einkristallen im transversalen Magnetfeld. (Investigation of an Antimony Crystal in a Transverse Magnetic Field.) Konrad Rausch. *Annalen der Physik,* ser. 6, v. 1, May 22, 1947, p. 190-206.

The relative electrical and thermal resistance of an antimony crystal in transverse magnetic fields up to 12 kilogauss. The differential thermo-electric force for antimony vs. constantan and for antimony perpendicular vs. antimony parallel to a crystal plane for temperatures of —194 to 25° C.; and the effect of a magnetic field on these values. 30 ref.

3c-34. Druck- und Temperaturkoeffizient des elektrischen Widerstandes einiger Legierungen. I. Einleitende Versuche. (Pressure and Temperature Coefficients of Electrical Resistance of Several Alloys. I. Introductory Research.) H. Ebert and J. Gielessen. *Annalen der Physik,* ser. 6, v. 1, May 22, 1947, p. 229-240.

Several two and three-element nonferrous alloys were investigated for their pressure and temperature coefficients. A number of them showed promise as materials for precision resistances.

3c-35. Improving Properties With Nickel Alloys. J. S. Vanick. *Canadian Metals & Metallurgical Industries,* v. 11, May 1948, p. 14-18.

What nickel does for bronze. An extensive survey of the improvements made in bronze alloys, together with the finished products' application. (To be continued.)

3c-36. Composition and Properties of Zinc Alloy Die Castings. *Production Engineering & Management,* v. 21, June 1948, p. 73.

Data for Zamak-3 and Zamak-5.

3c-37. Fatigue Properties of Some Coppers and Copper Alloys in Strip Form. H. L. Burghoff and A. I. Blank. *American Society for Testing Materials, Preprint* No. 28, 1948, 24 pages.

Results of reversed-bending fatigue tests on three types of Cu, five Cu-Zn alloys, and four other Cu-base alloys in the form of 0.032-in. strip. Relationships between fatigue strength, tensile strength, composition, degree of reduction by cold rolling, grain size, and angle of applied stress with respect to rolling direction.

3c-38. Etude statique de la magnétostriction dans les alliages fer-nickel austénitiques. (Static Study of Magnetostriction in Austenitic Iron-Nickel Alloys.) Henri Deveze. *Comptes Rendus* (France), v. 226, March 1, 1948, p. 727-729.

Results of an experimental study concerned most particularly with

self induction and with corresponding variation in length, for alloys containing 36 to 100% Ni.

3c-39. Influence of Pressure on the Resistance of Gold Silver Alloys. (In English.) A. Michels and T. Wassenaar. *Physica,* v. 14, April 1948, p. 61-62.

Electrical resistance for Au, Ag and three alloys of these metals as a function of pressure at 25° and 50° C.

3c-40. The Electrical Resistance of Potassium, Tungsten, Copper, Tin and Lead at Low Temperatures. (In English.) G. J. Van Den Berg. *Physica,* v. 14, April 1948, p. 111-138.

Measurements of electrical resistance of K wires in glass tubes, of single crystals of W, of technical Cu wires, of single crystals of Sn, and of Pb wires. 21 ref.

3c-41. Physical and Electrical Properties of Calcium. A. H. Everts and G. D. Bagley. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 265-271.

As-cast and annealed structures.

3c-42. The Densities of Magnesium-Cadmium Solid Solutions. J. M. Singer and W. E. Wallace. *Journal of Physical & Colloid Chemistry,* v. 52, June 1948, p. 999-1006.

The densities of 13 unannealed Mg-Cd alloys, containing 6.65 to 96.32 atomic per cent cadmium, were determined with an estimated precision of 0.1%. The densities of 7 additional alloys containing 21.7 to 84.0 atomic per cent Cd were determined before and after annealing. The influence of annealing on the density is practically negligible. Composition can be determined to about 0.5 unit or better by use of the density-composition curve. 12 ref.

3c-43. Metal Electrons and Alloy Catalysis; The System Gold-Cadmium. George-Maria Schwab and Soteria Pesmatjoglou. *Journal of Physical & Colloid Chemistry,* v. 52, June 1948, p. 1046-1053.

The two constants of the Arrhenius equation were measured for the dehydrogenation of gaseous formic acid with Ar-Cd alloys as catalysts. A functional relationship between the two. Brinell hardness of the alloys seems to run parallel to their activation energies. 12 ref.

3c-44. Indium Plated Lead Bearings Withstand High Stresses. Joseph Albin. *Materials & Methods,* v. 27, June 1948, p. 88-89.

Properties, plating procedures, and applications.

3c-45. Metastable States of Nickel Characterized by a High Initial Permeability. J. L. Snoek and J. F. Fast. *Nature,* v. 161, June 5, 1948, p. 887.

Variation of initial permeability of Ni with temperature.

3c-46. The Thermionic Properties of Chromium. H. B. Wahlin. *Physical Review,* series 2, v. 73, June 15, 1948, p. 1458-1459.

Spectral emissivity, temperature scale, and electron work function of Cr. Because it has very little ductility and therefore cannot be rolled or drawn into filaments of suitable shapes, a new method had to be used in preparing the samples.

3c-47. Uranium, Thorium, and Beryllium Melting and Fabrication. James F. Schumar. *U. S. Atomic Energy Commission,* AECD-1851, March 23, 1948, 9 pages.

Characteristics of above metals and difficulties encountered in casting them.

3c-48. Experimental Data on the Magneto-Striction of Nickel. Y. Rocard. *Engineers' Digest* (American Edition), v. 5, May-June 1948, p. 180-182, Translated and condensed from *La Revue Scientifique,* no. 3267, Feb. 15, 1947, p. 195-204.

Values for direct and inverse magnetostrictive effect and experiments with various circuits.

3c-49. A Metallurgical Investigation of Five Forged Gas-Turbine Discs of Timken Alloy. J. W. Freeman, E. E. Reynolds, and A. E. White. *National Advisory Committee for Aeronautics, Technical Note* No. 1531, June 1948, 55 pages.

Tests to determine reproducibility of properties of disks made by different companies and to investigate effect of various fabrication procedures on disk properties. Properties at room temperature and 1200° F. Tests included short-time tensile, stress-rupture, creep, and hardness, along with a metallographic examination of the materials before and after testing.

3c-50. A High Strength, High Conductivity Copper-Silver Alloy Wire. W. Hodge, R. I. Jaffee, J. G. Dunleavy, and H. R. Ogden. *Metals Technology,* v. 15, June 1948, T.P. 2366, 17 pages.

Alloy of copper and silver was developed from which it was possible to obtain 29 B. & S. gage strands with tensile strengths in excess of 160,000 psi. combined with an electrical conductivity of over 70% I.A.C.S. The properties from various binary alloys of Cu and Ag, together with the method of fabri-

cation developed to obtain the properties desired in fine-wire strands.

3c-51. Ueber die Brauchbarkeit und Verwendung von Zink in der Elektrotechnik. (Suitability of Zinc for Use in Electrical Technology.) Alfred Schulze. *Metall,* Nov. 1947, p. 76-79.

Present status of zinc as an electrical conductor. An alloy of zinc containing less than 1% Al meets the most important requirements, except that conductivity is considerably lower than copper or aluminum. A Zn-Fe alloy (0.13% Fe) has only slightly lower conductivity, but its mechanical properties and solderability are superior to those of the Zn-Al alloy.

3c-52. Metallurgical Topics. *Engineer,* v. 185, June 25, 1948, p. 616-617.

Properties of Cu-Cr and Cu-Ni-Cr alloys, the hot-quenching of steel, and application of hardenability to test methods.

3c-53. Transmission of Monoenergetic Slow Neutrons Through Solid Solutions and Mechanical Mixtures of TiC and WC. S. S. Sidhu. *Journal of Applied Physics,* v. 19, July 1948, p. 639-641.

Experimental results.

3c-54. The Young's Modulus and Strain Coefficient of Resistivity of Some Bismuth Rich Alloys. G. C. Kuczynski and J. T. Norton. *Journal of Applied Physics,* v. 19, July 1948, p. 683-686.

The above were determined for some Bi-Pb, Bi-Sn, Bi-Se, and Bi-Ni alloys. It was found that the modulus of elasticity decreases rapidly in the regions of solid solution, contrary to the predictions of Guillet. The strain coefficient of resistivity was found to increase rapidly within the limits of solid solubility while the stress coefficient of electrical resistivity remained constant.

3c-55. Resistance-Thermometer Bridge. S. S. Stack. *General Electric Review,* v. 51, July 1948, p. 17-21.

Compactness, ease of manipulation, and high accuracy without necessity for thermostatic control are attained in new bridge in which all coils of major importance are of a gold-chromium alloy; the exceedingly low temperature coefficient of resistance eliminates the necessity for thermostatic temperature control. Properties of the alloy; construction and operation of the bridge.

3c-56. A Note on Age-Hardening Ni-Bronze. G. P. Contractor and S. Viswanathan. *Journal of Scientific and Industrial Research,* v. 7, March 1948, p. 108-113.

Results obtained during investigation on properties of this alloy and to see whether, by suitable heat treatment, physical properties could be controlled to make it suitable as a bearing material. Composition and properties for high-duty bronzes and heat treated 88:5:5:2 alloy (Cu-Ni-Sn-Zn).

3c-57. Heat Transfer to Water Boiling Under Pressure. E. A. Farber and R. L. Scorah. *Transactions of the American Society of Mechanical Engineers,* v. 70, May 1948, p. 369-380; discussion, p. 380-384.

The film coefficient of heat transfer from a hot metal surface to a boiling liquid was estimated from experiments with an electrically heated wire submerged in the liquid. When water was boiled at atmospheric pressure, different heated metals gave different boiling curves. At different elevated pressures, the same metal gave different boiling curves. Data for nickel, tungsten, Chromel A, and Chromel C.

3c-58. The Superconductivity of Lanthanum and Cerium. W. T. Ziegler. *Journal of Chemical Physics,* v. 16, Aug. 1948, p. 838.

Results of measurements of the variation with temperature of the magnetic permeability of lanthanum and cerium.

3c-59. Elektrisches Verhalten und Allotropie von Uran. (Electrical Behavior and Allotropy of Uranium.) Georg Balz. *Metallforschung,* v. 2, May 1947, p. 144-146.

Electrical resistances of uranium melted in a vacuum between 0 and 1000° C. and the appearance of fluctuating changes at about 670 and 780° C. The reversibility of these changes, which indicate the existence of allotropic modifications of this element.

3c-60. Uber den Einfluss von Quecksilber auf die Festigkeitseigenschaften einer Magnesium-Mangan-Legierung. (The Effect of Mercury on the Strength Properties of a Magnesium-Manganese Alloy.) Walter Bulian. *Metallforschung,* v. 2, May 1947, p. 158-160.

The Mg-alloys contained 1.8% Mn and from 0.2 to 1.8% Hg. They were microscopically examined, tested for their strength properties, age hardening effects at higher temperatures and corrosion resistance.

3c-61. Ueber die Dauerstandfestigkeit von Zinklegierungen. (The Creep Strength of Zinc Alloys.) O. H. C.

Messner. *Schweizer Archiv,* v. 14, May 1948, p. 147-156; June 1948, p. 182-190.

Short and long-time creep tests are investigated and results are discussed. 107 ref.

3c-62. Berechnung der Zugfestigkeit von Metallen und ihrer Geschwindigkeits- und Temperaturabhängigkeit. (Calculating the Tensile Strength of Metals and Its Dependence on Rate and Temperature.) Albert Kochendorfer. *Metallforschung,* v. 2, June 1947, p. 173-186.

How to calculate the multi-crystal expansion curve and its tensile strength, and the effect of the rate and temperature of testing on the tensile strength of Al and Cu. Methods of calculating the tensile strengths of other metals. 32 ref.

3c-63. Alloys for Stereotyping. Part 2. R. G. Harper. *Electrotypers & Stereotypers Journal,* v. 13, July 1948, p. 2, 4, 24.

Properties of above alloys. Comparison of melting points and sequence of solidification. (To be continued.)

3c-64. Nickel in Non-Ferrous Castings. *Nickel Bulletin,* v. 21, June 1948, p. 78-81.

Properties and applications of: Al alloys containing nickel; Ni in bearing alloys; Cu alloys containing Ni; Sn bronzes; high tensile brass; Al bronze; Ni silver; Cu-Ni castings; Ni castings; high-Ni bronzes; monel castings; and special high-Ni alloys.

3c-65. A Rare Metal in Everyday Use. M. Schofield. *Discovery,* v. 9, Aug. 1948, p. 244-246.

Tantalum, its source, history, uses, and properties.

3c-66. German Magnetic Alloy Has Important Applications. G. W. Elman and E. A. Gaugler. *Power Generation,* v. 52, Sept. 1948, p. 64-67.

The significance and importance of magnetic alloys having rectangular hysteresis loops in the design of contact rectifiers and magnetic amplifiers. Deals especially with alloys of the Fe-Ni and Fe-Ni-Co series developed in Germany during the war.

3c-67. Berucksichtigung von Temperaturschwankungen bei der Härteprufung von Lagermetallen. (Effects of Temperature Fluctuations During Hardness Testing of Bearing Metals.) V. Schneider. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 423-425.

Results of hardness tests on white-metal bearings in the temperature range —25 to 40° C.

3c-68. Lagerschalen aus Verbundguss. (Bearing Shells From Plated Castings.) A. Schimmel. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 426.

The nature and function of the above and the behavior, properties, and production of different bearing alloys.

3c-69. The Surface Tension and Density of Lead-Antimony and Cadmium-Antimony Alloys. H. T. Greenaway. *Journal of the Institute of Metals,* v. 74, Nov. 1947, p. 133-148.

Research on several aspects of the surface tension of liquid metals and alloys, including the significance of this property in casting and soldering. Work of earlier investigators; construction and checking of the maximum-bubble-pressure apparatus; a simple, accurate method for measuring the densities of molten alloys.

3c-70. Etude de la variation de résistance électrique avec la température de l'alliage ferromagnétique MnSb. (Study of the Variation of Electrical Resistance With Temperature of the Ferromagnetic Alloy MnSb.) Georges Mannevy-Tassy. *Comptes Rendus,* v. 226, May 19, 1948, p. 1592-1593.

Experimental method and results.

3c-71. Changes in the Electrical Resistance of Tellurium in a Magnetic Field at Low Temperatures. (In Russian.) R. A. Chentsov. *Zhurnal Eksperimental' noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 18, April 1948, p. 374-385.

Results and method of measurement at the temperature of liquid helium. An anomaly was found consisting of decreasing resistance of tellurium in weak magnetic fields at temperatures below 4° K., which depends to great extent on orientation of the specimens in the magnetic field. 22 ref.

3c-72. A Copper-Base Alloy Containing Iron as a High-Strength, High-Conductivity Wire Material. Webster Hodge, R. I. Jaffee, J. H. Dunleavy, and H. R. Ogden. *Metals Technology,* v. 15, Aug. 1948, T.P. 2422, 10 pages.

The work described shows the possibility of producing fine wire of an alloy of copper and iron capable of being made into stranded cable with a tensile strength in excess of 150,000 psi. and more than one-half the electrical conductivity of pure copper. The preferred analysis is 10.0 to 15.0% Fe, 0.10 to 0.03% Mg, balance substantially Cu. Cr may be added to make a high-strength, corrosion resistant alloy with lowered electrical conductivity. Properly processed Cu-Fe alloys

might be used advantageously as conductor wires or for springs of relatively high conductivity.

3c-73. The Effect of the Melting Point and the Volume Magneto-Striction on the Thermal Expansion of Alloys. J. J. Went. *Philips Technical Review,* v. 10, Sept. 1948, p. 87-94.

Results of an investigation of the relationship of the expansion coefficient of alloys to the drop in their melting point and of the effect of volume magnetostriction upon the coefficient in the case of alloys of ferromagnetic materials. An empirical rule for the composition of alloys with a small expansion coefficient. The composition of an alloy consisting of Fe, Ni, Co, and Cu which is suitable for sealing to hard glass.

3c-74. Determination of Low Vapor Pressures at High Temperatures. II. Tin Vapor Pressure. (In Russian.) A. Granovskaya and A. Lynbimov. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, April 1948, p. 527-528.

Determined from 730 to 940° C. Method of investigation and apparatus used.

3c-75. Influence des variations reversibles et irréversibles de l'aimantation sur le pouvoir thermoélectrique des milieux ferromagnétiques. (Influence of Reversible and Irreversible Variations of Magnetization on the Thermo Electric Properties of Ferromagnetic Substances.) Jean Bouchard. *Comptes Rendus,* v. 226, June 7, 1948, p. 1895-1897.

Results of investigation for nickel, cupronickel, and two permalloys (78 and 81% Ni).

3c-76. Echanges isotopiques entre un amalgame monophasique de cuivre et les ions Cu.++ (Isotopic Exchange Between a Monophase Copper Amalgam and Cupric Ions.) Georges Kayas. *Comptes Rendus,* v. 226, June 28, 1948, p. 2144-2146.

Investigated using radioactive copper and a $CuSO_4$ solution.

3c-77. Dilatometric Effects of Hardening and Recrystallization in the 60 Copper-20 Nickel-20 Manganese Alloy. C. H. Samans, C. C. Brayton, H. L. Drake, and L. Litchfield. *American Society for Metals, Preprint* No. 31, 1948, 25 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 961-983; discussion, p. 983-984.

Using the Chevenard differential method, dilatometric studies were made up to 1475° F. on specimens of the alloy after various thermal and mechanical treatments. The nature of discontinuities found in the instantaneous coefficient of thermal expansion vs. temperature curves was investigated further by electrical resistance measurements up to 1150° F., and by Rockwell C hardness measurements after heating for constant short times over the entire range of temperatures.

3c-78. Nickel-Base Alloys for High Temperature Applications. A. G. Guy. *American Society for Metals, Preprint* No. 34, 1948, 12 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 125-136; discussion, p. 138-140.

Information on a new series of the above alloys containing Al, Mo, and Cr as the principal alloying elements. Rupture test data at 1500° F. show that a number of the alloys in the series have higher rupture strength than the best of the Co-base materials now in use.

3c-79. A Metallurgical Investigation of Two Contour-Forged Gas-Turbine Discs of 19-9 DL Alloy. J. W. Freeman, E. E. Reynolds,and A. E. White. *National Advisory Committee for Aeronautics, Technical Note* No. 1532, Sept. 1948, 37 pages.

Results of tests to determine the level of properties developed in large contour forgings of the alloy, to evaluate the effect of the temperature of hot cold work in these large forgings, and to show the degree to which the properties of bar stock can be reproduced in large forgings.

3c-80. A Metallurgical Investigation of Two Large Discs of CSA Alloy. E. E. Reynolds, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics, Technical Note* No. 1533, Sept. 1948, 33 pages.

Results of a study of properties at room temperature and 1200° F. Aging treatment is beneficial to rupture properties, while no effect on tensile, hardness, or time-deformation properties was observed.

3c-81.. Age-Hardening Nickel Alloys. Frederick C. Ochsner. *Product Engineering,* v. 19, Oct. 1948, p. 126-128.

Properties and uses for a new group of nickel alloys having controlled elastic properties or controlled expansion characteristics—the "Ni-Spans," produced by International Nickel.

3c-82. New Copper Base Alloys Possess Unusual Properties. *Steel,* v. 123, Oct. 4, 1948, p. 104, 106.

Five new Cu-base alloys for electrical and mechanical applications, other than resistance welding.

3c-83. Sull 'indurimento del rame mediante aggiunte di siliciuro di nichel.

(Concerning Hardening of Copper by Addition of Nickel Silicide.) Tommaso Natale. *La Metallurgia Italiana,* v. 39, May-June 1947, p. 126-133.

The solubility of Ni_2Si in Cu at different temperatures. The possibility of producing new copper alloys of high mechanical strength by this addition. Effects of heat treatment.

3c-84. Aimantation initiale et champ coercitif d'un monocristal de cobalt, suivant les axes de facile et difficile aimantation. (Initial Magnetization and Coercive Force of a Cobalt Monocrystal, Along the Axes of Easy and Difficult Magnetization.) Charles Guillaud and Roger Bertrand. *Comptes Rendus* (France), v. 227, July 5, 1948, p. 47-48.

Attempts to prove experimentally the possibility of application of Rayleigh's law. Method of investigation.

3c-85. Thermodynamics of Lead-Zinc Alloys. John Lumsden. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 8 pages.

Six free-energy equations from which can be derived the complete phase diagram and other thermodynamic properties of the Pb-Zn system. Of these, 4 represent the free energy of fusion and of vaporization of the components; one represents the free energy of formation of liquid alloys; and one deals with solid solutions of Zn in Pb. Applications to process metallurgy.

3c-86. The Low Temperature Properties of Tin and Tin-Lead Alloys. H. S. Kalish and F. J. Dunkerley. *Metals Technology,* v. 15, Sept. 1948, T. P. 2442, 20 pages.

Tensile data for tin and a series of pure tin alloys containing 0.01 to 50% Pb were measured at 11 temperatures from −196 to 20° C. Structures of different compositions after different heat treatments. 15 ref.

3c-87. Thermal and Electrical Properties of Ductile Titanium. E. S. Greiner and W. C. Ellis. *Metals Technology,* v. 15, Sept. 1948, T.P. 2466, 9 pages.

Lattice constants at room temperature, thermal expansivity between 30 and 800° C., as well as electrical resistivity and thermoelectric force vs. platinum between −200 and 1000° C. were determined. 20 ref.

3c-88. Effect of Grain Size on Tensile Strength, Elongation, and Endurance Limit of Deep Drawing Brass. Harold L. Walker and William J. Craig. *Metals Technology,* v. 15, Sept. 1948, T.P. 2478, 10 pages.

It is shown that grain sizes smaller than usually produced in industrial rolling may have a very material and beneficial effect upon mechanical properties, excepting ductility, of deep-drawing brass sheet. Endurance limit, for 100 million cycles of completely reversed stress, was almost doubled when the grain size was reduced from 0.024 to 0.004 mm. av. diam. Stiffness changes as brass, either annealed or severely cold-worked and stress relieved, is subjected to reversals of stress, especially during the first few thousand cycles.

3c-89. Screw Machine Engineering Data Sheet: Phosphor Bronze Rod Weight Per Foot. *Screw Machine Engineering,* v. 9, Oct. 1948, p. 41.

3c-90. Production Data Sheet: Alloys Commonly Used for Non-Ferrous Forgings. *Production Engineering & Management,* v. 22, Oct. 1948, p. 75.

Compositions and mechanical properties.

3c-91. Internal Friction and Precipitation From the Solid Solution of N in Tantalum. T'ing-Sui Ke. *Physical Review,* Ser. 2, v. 74, Oct. 15, 1948, p. 914-916.

The internal friction or acoustic absorption peak (vs. temperature) around 350° C. previously observed with a frequency of vibration of about one cycle per sec. was further analyzed. It was shown that this peak has its origin in the stress-induced interstitial diffusion of N in tantalum similar to the cases of C and O in tantalum previously reported. The precipitation of N from the solid solution was followed by internal-friction measurements.

3c-92. Non-Rectifying Germanium. W. C. Dunlap, Jr., and E. F. Hennelly. *Physical Review,* Ser. 2, v. 74, Oct. 15, 1948, p. 976.

Germanium of rather unique properties has been prepared. Most unique of the properties observed is an almost complete absence of surface rectification at the germanium-metal contact. Ingots of this type were prepared by melting germanium powder at a pressure of less than 10^{-4} mm. Hg. The powder was prepared by reduction of germanium dioxide in a hydrogen furnace. Ten-point, plane-welded contact rectifiers were made from one ingot and their residual rectification characteristics measured.

3c-93. Anomalous Values of the Thermionic Emission Constant. Henry F. Ivey. *Physical Review,* Ser. 2, v. 74, Oct. 15, 1948, p. 983-984.

Possible reasons for the fact that

the theoretical value for the thermionic emission constant, A, in the Richardson-Dushman equation is usually larger than measure valued. Data for Ni, Pt, and Zr.

3c-94. Anomalous Values of the Thermionic Emission Constant. E. P. Wohlfarth. *Physical Review,* Ser. 2, v. 74, Oct. 15, 1948, p. 984-985.

Contributes to discussion of the above abstract.

3c-95. New Alloy 50% Heavier Than Lead Serves Many Purposes. *Inco Magazine,* v. 22, Fall 1948, p. 14, 29.

G. E. Hevimet was developed as a shield against radioactive materials. Its high strength and fabricating properties make it adaptable to a variety of uses. It contains approximately 90% W, 6% Ni and 4% Cu. It is produced by powder metallurgy and is machinable.

3c-96. The Intermediate State of Superconductors. I. Magnetization of Superconducting Cylinders in Transverse Magnetic Fields. M. Désirant and D. Shoenberg. **II. The Resistance of Cylindrical Superconductors in Transverse Magnetic Fields. III. Theory of Behavior of Superconducting Cylinders in Transverse Magnetic Fields.** E. R. Andrew. *Proceedings of the Royal Society,* ser. A, v. 194, July 28, 1948, p. 63-112.

Experimental data for tin and mercury cylinders, together with a theoretical analysis of the results and correlation with the work of Landau. 40 ref.

3c-97. The Magnetic Properties of Ordered Nickel-Manganese Alloys. Robert I. Jaffee. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 867-870.

Ni-Mn alloys in the form of Rowland rings containing 20.1%, 21.4%, and 25.3% Mn were put into an ordered condition by very slow cooling to 380° C., and long annealing at that temperature. Magnetization curves and hysteresis loops at room temperature showed that the 21.4%-Mn alloys was very soft magnetically, while the 25.3%-alloy was relatively hard. The 20.1% alloy was magnetically soft, but not so soft as the 21.4%.

3c-98. The Bridge Erosion of Electrical Contacts. Part I. J. J. Lander and L. H. Germer. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 910-928.

Bridge erosion is the transfer of metal from one electrode to the other when an electric current is broken in a low-voltage circuit which is essentially purely resistive. It is associated with the bridge of molten metal formed between the electrodes as they are pulled apart, and more specifically with the ultimate boiling of some of the metal before the contact is finally broken. Results of fundamental studies of this bridge and of empirical measurements of the transfer of metal. 12 ref.

3c-99. Wrought Copper and Copper-Base Alloys. C. L. Bulow. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1785-1788.

Information published during the past year on mechanical and fabrication properties and corrosion resistance of these alloys. 55 ref.

3c-100. Nickel and High Nickel Alloys. W. Z. Friend. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1801-1804.

Summary is, for the most part, confined to a consideration of Ni and Ni-base alloys containing more than 50% Ni. Some attention also is given to Co-Ni base alloys. New alloys, fabrication procedures, properties, and applications. 83 ref.

3c-101. A New Nimonic Blade Material. *Aeroplane,* v. 75, Oct. 8, 1948, p. 481-482.

Tensile and creep-test results for Nimonic 80A, a new turbine-blade material developed in Britain. Other properties.

3c-102. Ottoni al nichel-berillio. (Brass Containing Nickel and Beryllium). G. Venturello and M. Bosio. *La Metallurgia Italiana,* v. 40, March-April 1948, p. 49-53.

A brass containing 76.74% Cu, 6.58% Ni, and 1.87% Be (maximum amounts) was studied from the points of view of crystal structure, mechanical properties, and corrosion resistance. Optimum conditions for heat treatment of such alloys.

3c-103. Dependence of the Magnetic Permeability of Alloys of the Permalloy Type on Frequency. (In Russian.) K. A. Goronina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 21, 1948, p. 459-462.

Investigation, using a Permalloy wire. Results indicate the complex character of permeability and the presence of dispersion. The dependence of permeability on frequency in the presence of a constant magnetic field along the wire. 10 ref.

3c-104. Der Thomson-Koeffizient einiger Metalle bei hohen Temperaturen. (The Thomson Coefficient of Several Metals at High Temperatures.) G. J. Ekkers, A. Farner, and R. Kläui. *Helvetica Physica Acta,* v. 21, Aug. 10, 1948, p. 218-219.

Method, and the results, of meas-

uring the Thomson coefficients of W, Mo, and Pt from 900 to 2700° K.

3c-105. Polarization and Adsorption Phenomena on Electrodes. (In Russian.) M. Loshkarev and A. Kryukova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 97-100.

The influence of B-naphthol, thymol and diphenylamine. Polarization curves are presented for Ag, Bi, Cd, Cu, Pb, Sn, Tl, and Zn. The results are interpreted.

3c-106. Possible Hazards Due to Cadmium-Coated Pipe and Fittings. Leo V. Garrity. *Journal, American Water Works Association,* v. 40, Nov. 1948, p. 1194-1196.

Possibility of poisoning when used in the water-supply system. Sufficient information is not available for a conclusion.

3c-107. Alliages de cuivre pour conducteurs electriques. (Copper Alloys for Electrical Conductors.) (Also in German.) Henri Bovet and Theophil Zurrer. *Pro-Metal,* v. 3, May 1948, p. 78.

The composition and physical and mechanical properties of a series of copper alloys widely used in Switzerland as conductors. Specific application of certain alloys.

3c-108. Electrical Properties of the Intermetallic Compounds Mg_2Sn and Mg_2Pb. W. D. Robertson and H. H. Uhlig. *Metals Technology,* v. 15, Oct. 1948, T.P. 2468, 11 pages.

Above compounds are two of the series which magnesium forms with elements of the fourth group of the periodic system. Since there is a complete series of compounds, all possessing the same comparatively simple structure, a unique opportunity is presented to study their properties with respect to increasing atomic number of the anion from silicon and germanium, through tin and lead. The present work deals with the two lower members of this group.

3c-109. The Effect of Grain-Size on the Damping Capacity of Alpha Brass. K. M. Entwistle. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 97-106.

Effect in both torsional and transverse vibration was investigated. Results are in close agreement with Zener's prediction of a contribution to damping capacity in all three kinds of vibration by intercrystalline thermal currents. 13 ref.

3c-110. Aluminum Bronze Alloys — Their Properties and Applications. John C. Kemp. *Iron Age,* v. 162, Nov. 25, 1948, p. 76-79, 98.

3c-111. Zink als Leiterwerkstoff (Zinc as a Conductor.) A. Schulze. *Archiv fur Technisches Messen,* Feb. 1948, p. T48 (2 pages).

Physical and chemical properties of zinc and a Zn-Al alloy and their effect on the conductivity of these metals.

3c-112. Properties and Applications of Low-Temperature Alloys. Frank Charity. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 137-138, 140, 142, 144.

Alloys which melt at temperatures under 300° F. Production of rigid molds from wax patterns, repair of cracked dies, and production of finished products are among the many uses.

3c-113. Bolted Aluminum-to-Copper Connections. W. F. Bonwitt. *Electrical Engineering,* v. 67, Dec. 1948, p. 1190. Condensed from "An Experimental Investigation of the Electrical Performance of Bolted Aluminum-to-Copper Connections" to be published in *AIEE Transactions,* v. 67, 1948.

Results of extensive tests in which various electroplates and other metallic coatings were applied to the copper members. Different compounds were also used between the contact surfaces, and tests were made using only the bare metals. 21 combinations were evaluated both at elevated temperatures and in a corrosive atmosphere. Main criterion of performance was electrical resistance. Results are summarized, showing completely satisfactory performance when the proper treatment had been applied.

3c-114. The Elastic Constants of Beta-Brass. David Lazarus. *Physical Review,* ser. 2, v. 74, Dec. 1, 1948, p. 1726-1727.

Data obtained at 25° C. They differ markedly from those obtained by W. A. Good in 1941, hence are reported together with substantiating evidence. Work of other investigators is also reviewed.

3c-115. Le bronze au glucinium. (Beryllium Bronzes.) (Also in German.) Marcel Etienne. *Pro-Metal,* v. 1, July 1948, p. 149-153.

Chemical compositions, physical and mechanical properties, and optium conditions of heat treatment.

3c-116. Note sur quelques alliages d'argent a durcissement structural. (Note Concerning Some Silver Alloys Having Hardened Structures.) Marcel Ballay and Pierre Vogt. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 254-260.

A method of hardening of silver

alloys (80 to 95% Ag) consisting of addition of different elements such as Cu, Al, Zn, Ni, and Sn, and additional heat treatment. Influence of each of these constituents.

3c-117. Alliages binaires ferromagnétiques du manganese (arseniures, azotures). (Binary Ferromagnetic Manganese Alloys — Arsenides, Nitrides.) Charles Guillaud and Jean Wyart. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 271-276; discussion, p. 276.

The magnetic properties were investigated. Methods of production, structures and transformations.

3c-118. The Vapor Pressures of Inorganic Substances. I. Beryllium. Robert B. Holden, Rudolph Speiser, and Herrick L. Johnston. *Journal of the American Chemical Society,* v. 70, Nov. 1948, p. 3897-3899.

The above was measured in the range 1171 to 1552° K. by measurement of both the rate at which the metal surface evaporates into a vacuum and the rate at which saturated metal vapor effuses through an orifice. Results obtained by these methods are in good agreement.

3c-119. Materials for Collapsible Tubes. T. C. Du Mond. *Materials & Methods,* v. 28, Dec. 1948, p. 82-84.

Their property requirements. Aluminum has joined lead and tin as a suitable material.

3c-120. Uber den Siedepunkt von Indium. (The Boiling Point of Indium.) E. J. Kohlmeyer and H. Spandau. *Zeitschrift fur anorganische Chemie,* v. 253, March 15, 1945, p. 37-40.

Method of determination and details of observations. The boiling point was found to be 2000 ± 10° C.

3c-121. Kavitationsuntersuchungen an Aluminium- und Zinklegierungen. (Cavitation Research on Aluminum and Zinc Alloys.) Hans Nowotny. *Metallforschung,* v. 1, Dec. 1946, p. 182-192.

General discussion of the wear of materials by cavitation and the effect of chemical action, pressure, surface conditions, and structure constituents on this type of wear. 18 ref.

3c-122. Uber eine hochaluminiumhaltige Zinklegierung. I. Gepresster Zustand. II. Aushartung des gepressten Zustandes. (An Aluminum-Rich Zinc Alloy. I. Extruded Condition. II. Hardening of the Extruded Material.) Erich Gebhardt. *Metallforschung,* v. 2, Jan. 1947, p. 17-25; Feb. 1947, p. 57-62.

Preparation, properties, and structure of a new alloy containing 32% Al, 3% Cu, 0.05% Mg, and the remainder Zn. Tensile strength, yield point, hardness, compression strength, and creep strength are especially good. The alloy was also found to be suitable for hot and cold forming in the sintered condition. Corrosion resistance is also mentioned briefly. In Part II, determination of suitable heat treating procedures is described, together with effects of variations on mechanical properties and corrosion resistance.

3c-123. Kontaktwerkstoffe auf Silbergrundlage. (Silver-Base Electrical-Contact Materials.) Karl Wilhelm Frohlich. *Metallforschung,* v. 2, Jan. 1947, p. 29-32.

Factors limiting pure silver as a satisfactory contact metal, and methods for improving it. The following substitutes are discussed: Ag + 1.5% Si; Ag + 0.15% Ni; sintered Ag-W alloys; sintered Ag alloys containing 20 to 30% Ni or Fe; and Ag + 30% Zn.

3c-124. Uber die elektrischen und thermischen Eigenschaften des Urans. (Electrical and Thermal Properties of Uranium.) Hermann Ebert and Alfred Schulze. *Metallforschung,* v. 2, Feb. 1947, p. 46-49.

Samples containing 99.9 and 99.5% U, respectively, were investigated. Specific electrical resistances, thermal conductivities, densities, and coefficients of expansion were determined.

3c-125. Kupfer als Leiterwerkstoff. (Copper as a Conductor. I and II.) A. Schulze. *Archiv fur Technisches Messen,* July 1947, p. T12-T13 (4 pages); Oct. 1947, p. T32 (2 pages).

Chemical, physical, and electrical properties of Cu and the effect of alloys and impurities on its electrical conductivity and resistance. 23 ref.

3c-126. Die Kontaktwanderung bei Abhebekontakten aus Unedelmetalle enthaltenden Goldlegierungen. (Migration of the Contact Area as a Result of the Opening and Closing of Gold-Alloy Contacts Alloyed With Base Metals.) Ernst Raub. *Metallforschung,* v. 2, Sept. 1947, p. 281-288.

The contact area migrates as a result of build up of metal transferred from one contact to the other by means of the spark which bridges the gap during making and breaking the contact. This effect was studied for numerous binary and several ternary alloys.

3c-127. Sullo smorzamento di alcune leghe di rame. (Concerning the Vibration-Damping Capacity of Certain Copper Alloys.) L. Locati and R. Di

Carlo. *La Metallurgia Italiana,* v. 39, Sept.-Oct. 1947, p. 201-205.

The damping capacity of copper alloys containing various amounts of Zn, Ni, and Mn. Relationships between damping, microstructure, and other physical and mechanical properties.

3c-128. Minimum Sparking Potentials of Barium, Magnesium, and Aluminum in Helium. Harold Jacobs and Armand P. LaRocque. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 337-350; discussion, p. 350.

3c-129. Fatigue Characteristics of Some Copper Alloys. H. L. Burghoff and A. I. Blank. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 695-710; discussion, p. 711-712.

Previously abstracted from preprint. See item 3c-14, 1948.

3c-130. The Fatigue Characteristics of Copper-Nickel-Zinc and Phosphor Bronze Strip in Bending Under Conditions of Unsymmetrical Loading. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 713-721; discussion, p. 722-724.

Previously abstracted from preprint. See item 3-214, 1947.

3c-131. The Creep Characteristics of Copper and Some Copper Alloys at 300, 400, and 500° F. H. L. Burghoff and A. I. Blank. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 725-753; discussion, p. 754.

Previously abstracted from preprint. See item 3c-15, 1948.

3c-132. Welding or Sticking of Electrical Contacts. Erle I. Shobert, II. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 755-769.

Previously abstracted from preprint. See item 3-217, 1947.

3c-133. Hardness Conversion Chart for Nickel and High-Nickel Alloys. F. P. Huston, Jr. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 770-780; discussion, p. 781.

3c-134. Leitfahigkeit und Hall-Effekt von Germanium. (Conductivity and Hall Effect of Germanium.) Walter Ringer and Heinrich Welker. *Zeitschrift fur Naturforschung,* v. 3a, Jan. 1948, p. 20-29.

Melting of Cu-Ge alloys in a high vacuum and the method of measuring conductivity and Hall effect. How the extraordinarily high mobility indicated by the measurements can be explained by the wave-mechanical theory of metals. Melting and testing equipment.

3c-135. Uber optische Konstanten und elektrischen Widerstand dicker Metallschichten. (Optical Constants and Electrical Resistance of Heavy Layers of Metal.) Karl Weiss. *Zeitschrift fur Naturforschung,* v. 3a, Mar., 1948, p. 143-147.

Attempts to obtain absolute values for the optical constants of gold, silver, and copper, the required mirrors being prepared by evaporation. Apparatus and methods. 18 ref.

3d—Light Metals

3d-1. When You Buy Aluminum. *Sheet Metal Worker,* v. 38, Dec. 1947, p. 67-68.

Some facts on sheet aluminum, as a guide in purchasing.

3d-2. Incrudimento e Proprieta Elettriche dell' Alluminio. (Cold Working and Electrical Properties of Aluminum.) V. Montoro. *Alluminio,* Sept-Oct. 1947, p 409-412.

The effects of cold working and tempering on the electrical properties of 99.91% aluminum.

3d-3. Thermal Conductivity of Aluminum. *Engineer,* v. 184, Dec. 26, 1947, p. 600.

Critically reviews recent papers.

3d-4. Ternary Aluminum Alloys. L. Sanderson. *Machinery Lloyd* (Overseas Edition), v. 20, Jan. 3, 1948, p. 110-112.

Properties of a series having an Al-Mg-Zn phase in combination with a range of additional alloys in suitable percentages.

3d-5. Development of Cast Aluminum Alloys for Elevated-Temperature Service. Webster Hodge, L. W. Eastwood, C. H. Lorig, and H. C. Cross. *National Advisory Committee for Aeronautics, Technical Note* No. 1444, Jan. 1948, 32 pages.

Effects of heat treatment and exposure to elevated temperatures on the tensile properties of various alloys subsequently cooled to room temperature; effects of various alloy additions on the room and elevated-temperature properties of 6% Mg aluminum alloys; and improvement in high-temperature creep properties.

3d-6. Effect of Various Stress Histories on the Flow and Fracture Characteristics of the Aluminum Alloy 24 S-T. J. J. Lynch, E. J. Ripling, and G. Sachs. *Metals Technology,* v. 15, Jan. 1948, T. P. 2307. 24 pages.

The effects of straining (at room temperature) by various methods on flow and fracture determined by tension tests. 12 ref.

3d-7. Zicral—A New High-Tensile Light Alloy. P. Vachet. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 31-35. Translated and condensed from *Revue de l'Aluminium,* v. 24

June 1947, p. 189-198; July-Aug. 1947, p. 225-233.

Development of above aluminum alloy, its corrosion resistance, protection by plating and anodizing, influence of purity and of chromium content, structure and metallography, heat treatment, working, mechanical and physical properties, and joining. Previously abstracted from original paper. See item 3-306, R.M.L., v. 4, 1947.

3d-8. Low-Cycle Fatigue of the Aluminum Alloy 24 S-T in Direct Stress. S. I. Liu, J. J. Lynch, E. J. Ripling, and G. Sachs. *Metals Technology,* v. 15, Feb. 1948, T. P. 2338, 22 pages.

Most investigations on fatigue are concerned entirely with large numbers of cycles. However, changes occurring after a small number of repeated loadings have attracted little attention. This paper deals with effects of strains of equal magnitude but different signs. The metal was first pre-strained in static tension by a certain amount then subjected to compression to yield the same amount of strain after unloading. This cycle was repeated up to a maximum of seven times. After various cycles, stress-strain curves in tension were determined, up to fracturing.

3d-9. Die Aluminium-Silizium-Gusslegierungen—Giesstechnische und Mechanische Eigenschaften. (Cast Aluminum-Silicon Alloys—Castability & Mechanical Properties.) R. Irmann. *Metalen,* v. 2, Jan. 1948, p. 87-93.

Castability and mechanical properties of Al-Si alloys. Effects of varying percentages of silicon on the properties of the casting alloys.

3d-10. Investigations on Aluminum Alloys of High Strength at Room Temperature. B. W. Mott and J. Thompson. *Metal Treatment,* v. 14, Winter 1947-48, p. 227-238.

Results of a comprehensive investigation of the properties of wrought Al alloys, containing Mg, Zn, and Mn as the principal alloying elements. The tests involved determination of tensile properties, hardness, and resistance to fatigue and stress corrosion. 28 ref. (To be continued.)

3d-11. Aluminum Pipe and Tubing. Paul Brandt. *Heating and Ventilating,* v. 45, Feb. 1948, p. 83-86.

Data on properties to help evaluate the use of aluminum pipe for heating and ventilating work.

3d-12. Aluminum Foil. Part I—Its Properties for Packaging. Junius D. Edwards and D. B. Strohm. *Modern Packaging,* v. 21, Feb. 1948, p. 143-147, 192, 194.

Mechanical properties, water-vapor transmission rates, reflectivity for light and radiant heat, hygienic characteristics, resistance to corrosion, and other vital information.

3d-13. Examen de Cables Conducteurs en Almélec et en Aluminium-Acier Déposés Apres 15 a 25 ans de Service. (Examination of Conductor Cables of Almelec and Aluminum Steel Removed After 15 to 25 Years in Service.) Jean Herenguel. *Revue de l'Aluminium,* v. 24, Dec. 1947, p. 357-260.

Almelec cables examined after long-time service showed good corrosion resistance to atmospheric effects and no changes in mechanical strength. This aluminum alloy contains 0.7% Mg, 0.5% Si, and less than 0.3% Fe.

3d-14. Fatigue Strength and Related Characteristics of Aircraft Joints. Part II. Fatigue Characteristics of Sheet and Riveted Joints of 0.040-Inch 24 S-T, 75 S-T, and R 303-T 275 Aluminum Alloys. H. W. Russell, L. R. Jackson, H. J. Grover, and W. W. Beaver. *National Advisory Committee for Aeronautics, Technical Note No.* 1485, Feb. 1948, 97 pages.

Results for direct-stress fatigue tests of sheet materials including unnotched specimens, specimens notched by drilled holes, and specimens with surface scratches; fatigue tests of riveted lap joints, riveted butt joints with various stiffeners, and multi-arc welded butt joints; tests of sheet materials and various joints at elevated temperature; and tests of cumulative fatigue damage.

3d-15. Elastic Modulus Research; Development of Alloys With High E Values. *Metal Industry,* v. 72, Feb. 20, 1948, p. 146, 152.

Reviews recent published work by Dudzinski and others in which several new and complex aluminum alloys were developed.

3d-16. Aluminum Alloys. G. Fitzgerald-Lee. *Aluminium and the Non-Ferrous Review,* v. 12, Oct.-Dec. 1947, p. 73-74, 76, 78, 80.

Reviews the various types made in Britain. Effects of each alloying metal. Table gives compositions and properties of the main commercial alloys.

3d-17. Tensile, Fatigue, and Creep Properties of Forged Aluminum Alloys at Temperatures Up to 800° F. L. R. Jackson, H. C. Cross, and J. M. Berry. *National Advisory Committee for Aeronautics, Technical Note No.* 1469, March 1948, 48 pages.

Data on properties of forged alu-

minum alloys XB 18 S, 18 S, 24 S, and 32 S, which are pertinent to their use between 70 and 800° F. Included are data taken from published sources, unpublished material made available through the courtesy of the Aluminum Co. of America and the National Bureau of Standards, and original data, obtained at Battelle Memorial Institute, which extend this previous information. Application to design of aircraft engines.

3d-18. The Influence of Chemical Composition and Quality of Raw Materials on the Physical Properties of Silumin Gamma. Vlad. Zednik. *Metallurgia,* v. 37, Feb. 1948, p. 195-200; March 1948, p. 253-258.

For casting purposes, an Al-base alloy with additions of Si and Mg proved to be one of the best from the point of view of good all-round properties. This alloy, known commercially as silumin (Alpax) gamma, derives its properties from the binary Al-Si eutectic alloy modified with sodium. Details of the development of, and experiences with, this alloy at the Skoda works in Czechoslovakia. Second part is largely devoted to use of Co and Mn as compensators for the undesired effects of small percentages of Fe and Ti. Structures of various compositions and those resulting from production variations.

3d-19. Typical Mechanical Properties of Aluminum Sheet and Plate. *Production Engineering & Management,* v. 21, April 1948, p. 71.

A table.

3d-20. Properties and Applications of Aluminum Casting Alloys. Floyd A. Lewis. *Electrical Manufacturing,* v. 41, April 1948, p. 112-117, 149-150.

3d-21. Aluminum-Zinc-Magnesium-Copper Casting Alloys. L. W. Eastwood and L. W. Kempf. *American Foundrymen's Association, Preprint* No. 48-12, 1948, 12 pages.

Tensile properties and hardnesses of the above alloys containing approximately 0.25% Cr and 0.15% Ti were investigated over a range of 0 to 1.75% Cu, 3 to 13% Zn and 0 to 1.0% Mg. Cr and Ti were added for their specific effects on resistance to corrosion and grain refinement, respectively. In sand castings, approximately 0.4% Cu, 6.6% Zn, 0.33% Mg, 0.25% Cr, and 0.15% Ti appear to give good strength and ductility together with satisfactory resistance to corrosion. Castings of this type, however, have the disadvantage of being somewhat "hot short". Tensile properties at elevated temperatures are relatively low. 13 ref.

3d-22. Effect of Titanium on Grain Size and Tensile Properties of an Aluminum-4.5% Copper (No. 195) Casting Alloy. W. E. Sicha and R. C. Boehm. *American Foundrymen's Association Preprint* No. 48-16, 1948, 11 pages.

Effects of 0.05, 0.10, 0.20 and 0.40% Ti. An optimum Ti addition which would produce a very fine grain at any given pouring temperature was found to exist. This amount increased as the pouring temperature was raised. The grain-refining effect is attributed to $TiAl_3$ particles, reduced in size by an incomplete peritectic reaction, which serve as nuclei for starting of crystallization. The additions affect tensile properties in several ways. 10 ref.

3d-23. Effects of Surface Finish, of Certain Defects, and of Repair of Defects by Welding, on Fatigue Strength of 355-T 6 Sand-Castings; and Effects of Prior Fatigue Stressing on Tensile Properties. F. M. Howell, G. W. Stickley, and J. O. Lyst. *National Advisory Committee for Aeronautics, Technical Note No.* 1464, April 1948, 49 pages.

Surfaces studied included as-cast, machined, grit-blasted, and shot-blasted. Unsound conditions included different degrees of porosity and other kinds of defects. Results showed that compositions and tensile properties of the castings comply in general with the requirements of A.S.T.M. and government specifications. 355-T 6 is an Al alloy with a nominal composition of 1.3% Cu, 5.0% Si, and 0.5% Mn.

3d-24. Aluminum-Sheathed Power Cables. *Engineer,* v. 185, April 23, 1948, p. 398-399.

Physical and mechanical properties of aluminum sheathing, and cable characteristics and performance in service. (To be continued.)

3d-25. Investigations on Aluminum Alloys of High Strength at Room Temperature. Part II. B. W. Mott. *Metal Treatment.* v. 15, Spring 1948, p. 33-46.

Investigation made into the properties of wrought aluminum alloys containing Mg, Zn, and Mn as the principal alloying elements. The tests involved the determination of tensile properties, hardness, and forging behavior; and some tests were also made on the suitability of the alloys for casting. (To be concluded.)

3d-26. Stress-Strain and Elongation Graphs for Alclad Aluminum-Alloy 24 S-T Sheet. James A. Miller. *National Advisory Committee for Aeronautics,*

Technical Note No. 1512, May 1948, 37 pages.

Tensile and compressive stress-strain and stress-deviation to a 1% strain; tangent modulus and reduced modulus for a rectangular section against stress in compression; stress-strain of tensile specimens tested to failure; and local elongation and elongation against gage length for tensile specimens tested to fracture.

3d-27. Stress-Strain and Elongation Graphs for Alclad Aluminum-Alloy 24 S-T 81 Sheet. James A. Miller. *National Advisory Committee for Aeronautics, Technical Note,* No. 1513, May 1948, 36 pages.

Data similar to that of Technical Note No. 1512 (see above abstract), for 24 S-T 81.

3d-28. Hardness Ranges for Various Materials. *Materials & Methods,* v. 27, May 1948, p. 105, 107.

Data for 78 materials.

3d-29. Variation du Pouvoir Thermoelectrique des Metaux par Dissolution d'Elements. (Variation of the Thermoelectric Properties of Metals on Addition of Other Elements.) Charles Crussard and Francis Aubertin. *Comptes Rendus* (France), v. 226, March 22, 1948, p. 1003-1005.

Results of determination of variations caused by addition of Sn, Si, Ti, Cr, Mn, Fe, Ni, Cu, and Mg to 99.995% Al. Results are correlated with position in the periodic table.

3d-30. Engineering Characteristics of 61 S Aluminum Alloy Sheet. Joseph J. Warga. *Product Engineering,* v. 19, June 1948, p. 108-112.

Fabricating and engineering properties of sheet Al-Mg-Si alloys 61 S. Data on heat treatment; mechanical properties of sheet, both without and with heat treatment, and in workhardened conditions; and resistance to corrosion. Welding and forming characteristics.

3d-31. Anodic Behavior of Aluminum in a Magnetic Field. George Antonoff and Anne Rowley. *Journal of Physical & Colloid Chemistry,* v. 52, June 1948, p. 1105-1108.

Aluminum immersed in a solution of certain aluminum salts does not conduct anodically, or does so very poorly. The usual explanation is that the passage of current is prevented by the formation of an oxide film. Other factors may be responsible for this peculiarity of aluminum and of other metals.

3d-32. New Temper Designations for Aluminum Alloys. R. B. Smith. *Iron Age,* v. 161, June 24, 1948, p. 72-78.

Modified system to meet requirements in industry.

3d-33. The Room and Elevated Temperature Properties of Some Sand-Cast Magnesium-Base Alloys Containing Zinc. Thomas E. Leontis. *Metals Technology,* v. 15, June 1948, T.P. 2371, 35 pages.

Certain Zn-containing Mg alloys have considerably higher tensile properties and creep resistance at elevated temperatures than present commercial Mg alloys and at the same time exhibit tensile properties at room temperature at least equal to those of the commercial alloys. 32 ref.

3d-34. The Flow and Fracture Characteristics of the Aluminum Alloy 24 ST After Alternating Tension and Compression. S. I. Liu and G. Sachs. *Metals Technology,* v. 15, June 1948, T.P. 2392, 12 pages.

Tests were made, varying both the tension strain and the compression strain within extreme limits. The tests revealed phenomena which have not been recognized to date. Further data were provided by using specimens of various contours (notched specimens) in the subsequent tensile tests.

3d-35. An Evaluation of Magnesium in Germany During World War II. Part IV. Hubert Altwicker and Ernest Josef deRidder. *Modern Metals,* v. 4, June 1948, p. 24-27.

Magnesium's resistance to corrosion, fatigue strength and the use of Mg-Al alloys by the German army and air force. (To be concluded.)

3d-36. Investigation on the Validity of an Ideal Theory of Elasto-Plasticity for Wrought Aluminum Alloys. E. G. Thomsen, I. Cornet, I. Lotze, and J. E. Dorn. *National Advisory Committee for Aeronautics, Technical Note* No. 1552, July 1948, 47 pages.

An investigation to determine relation between stresses and plastic strains of wrought aluminum alloys for tension, compression, and torsion loading. Stress-strain curves for various aluminum alloys.

3d-37. New Magnesium Alloys Offer Superior Properties. Kenneth Rose. *Materials & Methods,* v. 28, July 1948, p. 66-69.

Higher strength results from use of zirconium; cerium additions in another alloy provide better strength at high temperatures.

3d-38. Rare Metals Improve Magnesium Alloys. *Iron Age,* v. 162, July 22, 1948, p. 83.

How Zr and Ce are used to produce high strength, toughness, and

resistance to creep at high temperatures.

3d-39. Aluminium Alloys. 2. Wrought Alloys. G. Fitzgerald-Lee. *Aluminium and the Non-Ferrous Review,* v. 13, Jan.-March 1948, p. 1-2, 4.

Compositions and properties of the British types.

3d-40. Magnesium Casting Alloys. *Metal Industry,* v. 73, July 23, 1948, p. 66, 73.

Investigation carried out with the magnesium-aluminum-zinc-manganese alloy AZ 92, which in the initial experiments was melted in a steel crucible. The beryllium was added to the magnesium in the form of an aluminium-beryllium master alloy containing 5.3% beryllium, the temperature adjusted to about 760° C., and the zinc and manganese chloride then stirred in. Results of this procedure.

3d-41. The Properties of Extruded Aluminium-Alloy Bar. L. Northcott, D. McLean and O. R. J. Lee. *Engineering,* v. 166, July 23, 1948, p. 93-95.

Results of an investigation into the effect of extrusion through die plates, having 1, 2, 3, or 4 holes, on the mechanical properties of the bars.

3d-42. Tvarené polotovary z hliniku a z hlinikovych slitin. (Formed Aluminum Products and Semifinished Shapes.) R. Henych and B. Puchnar. *Hutnické Listy,* v. 3, April-May, 1948, p. 109-115.

Composition, mechanical properties, and other characteristics determining the applications of products made in Czechoslovakia.

3d-43. Hlinik a jeho slitiny. (Aluminum and Its Alloys.) Jiri Mackievic. *Hutnické Listy,* v. 3, April-May 1948, p. 98-109; June 1948, p. 171-178.

First installment classifies all commercial Al alloys sold under various trade names into main groups and subgroups according to their chemical composition. Group differences and similarities are outlined. Second part deals with the constitutional diagram of binary Al alloys and relationships to mechanical properties. The influence of individual alloying elements. 17 ref.

3d-44. Investigations on Aluminum Alloys of High Strength at Room Temperature. (Concluded.) B. W. Mott and J. Thompson. *Metal Treatment and Drop Forging* v. 15, Summer 1948, p. 91-105.

Test on fatigue and stress-corrosion resistance. Microstructures observed.

3d-45. Aluminium Alloy Casting Developments. E. G. West. *Machinery Lloyd* (Overseas Edition), v. 20, July 31, 1948, p. 68-78.

Development of the present-day alloys; improvements in casting practice; and expansion of the fields of application. 12 ref.

3d-46. A Die-Casting Aluminium Alloy. *Engineer,* v. 186, Aug. 6, 1948, p. 141.

Chemical composition and physical and mechanical properties for Hiduminium 51.

3d-47. Hot-Shortness of Some High-Purity Alloys in the Systems Aluminium-Copper-Silicon and Aluminium-Magnesium-Silicon. P. H. Jennings, A. R. E. Singer, and W. I. Pumphrey. *Journal of the Institute of Metals,* v. 74, Jan. 1948, p. 227-248.

Use of the ring-casting test and the restrained-weld test. Ternary hot-shortness diagrams for both systems showing the relative welding and casting behavior of alloys in the ranges 0 to 10% copper, 0 to 4% silicon; and 0 to 10% magnesium, 0 to 5% silicon. The original hot-shortness theory use extended to ternary systems. 16 ref.

3d-48. A Consideration of the Constitution of Aluminium-Iron-Silicon Alloys and Its Relation to Cracking Above the Solidus. P. H. Jennings and W. I. Pumphrey. *Journal of the Institute of Metals,* v. 74, Jan. 1948, p. 249-258.

The question of whether the susceptibility to cracking is related to the constitution, and if it is, in what manner. From literature concerning the constitution of the Al-rich alloys in the Al-Fe-Si system, it is clear that, in alloys containing more iron than silicon, the theoretical solidus temperature is not apparent in practice, the completion of freezing occurring at much higher temperature. 14 ref.

3d-49. The Young's Modulus of Some Aluminium Alloys. N. Dudzinski, J. R. Murray, B. W. Mott, and B. Chalmers. *Journal of the Institute of Metals,* v. 74, Jan. 1948, p. 291-310.

Various binary, ternary, and complex Al-base alloys were prepared to investigate the possibility of increasing their Young's modulus. All the five elements investigated were found to enhance its value, Mn having the greatest effect and the elements Be, Co, Ni, and Si having decreasing effects in that order. The possibility of developing alloys combining high strength with improved Young's modulus.

3d-50. The Moduli of Aluminium Alloys in Tension and Compression. S. F. Grover, W. Munro, and B. Chalmers. *Journal of the Institute of Metals,* v. 74, Jan. 1948, p. 310-314.

This article is an appendix to the one preceding it. (See above abstract.) Tests designed to determine whether, for aluminum alloys, the Young's modulus in tension is the same as the Young's modulus in compression. Both bar and sheet stock were tested. Results indicated that, within limits of experimental error, the moduli in tension and compression are the same.

3d-51. The Effect of 1% Silicon on the Melting Points of Aluminium-Magnesium-Manganese-Zinc Alloys. H. J. Axon, E. Butchers, and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 74, Feb. 1948, p. 330-344.

Melting points of Al-Mg-Mn-Zn-Si alloys containing 1% Si were determined for alloys containing from 0 to 8% Mg, 0 to 2% Mn, and 0 to 8% Zn. Results are compared with those for the corresponding quaternary Al-Mg-Mn-Zn alloys. If the Mg content is less than 1 or 2%, the melting point of the alloy may be lowered markedly by the addition of 1% Si.

3d-52. The Effect of Vibration on a Precipitation-Hardening Aluminium Alloy. R. F. Hanstock. *Journal of the Institute of Metals,* v. 74, May 1948, p. 469-492.

The dynamic properties of a precipitation-hardening Al alloy were investigated by determining the relation between damping capacity and strain amplitude for various metallurgical conditions of the alloy. Suggests that strain-dependent damping capacity is attributable to dislocations generated under the combined influence of strain and thermal fluctuations. 16 ref.

3d-53. Tvarené polotovary z hliníkovych slitin typu Al-Zn-Mg o vysoké pevnosti. (High Strength Aluminum-Alloy Semifinished Products of the Al-Zn-Mg Type.) Jiri Chvojka, *Hutnické Listy,* v. 3, June 1948, p. 178-182.

Development and influence of different alloying elements and of heat-treatment.

3d-54. Factors Affecting the Tensile Notch Sensitivity of Magnesium Alloy Extrusions. I. Cornet. *Metals Technology,* v. 15, Aug. 1948, T.P. 2419, 23 pages.

Notch sensitivities of various Mg alloys were determined under axial and also several conditions of non-axial tension. Hardness, grain size and other metallographic features; stress-strain data, and chemical compositions. Notch sensitivity under axial tensile load was determined for a few specimens which had been cold worked to various degrees by tensile prestraining. Tensile notch sensitivities showed little or no correlation with stress-strain or other conventional data. Therefore one alloy magnesium O, was selected for intensive study. 10 ref.

3d-55. Magnesium; An Engineering Material of the Future. *Western Metals,* v. 6, Sept. 1948, p. 35.

Properties and applications.

3d-56. Alliage léger a traitement thermique A-U 5 G T (APM). [A Light Alloy Capable of Heat Treatment: A-U 5 G T (APM).] Gustave Caminade. *Fonderie,* July 1948, p. 1242-1244.

Alloy contains 0.35% Fe (max.), 0.40% Si (max.), 4.20 to 5.00% Cu, 0.10% Zn (max.), 0.18 to 0.40% Mg, 0.10% Mn (max.), 0.03% Ni (max.), 0.03% Sn (max.), and 0.17 to 0.35% Ti; remainder Al. Its melting, casting, heat treatment, and mechanical properties.

3d-57. Bearing Tests of 14 S Sheet and Plate. R. L. Moore. *National Advisory Committee for Aeronautics, Technical Note* No. 1502, Aug. 1948, 18 pages.

Tests made to determine bearing yield and ultimate strengths of bare and Alclad 14 S-W and 14 S-T sheet and plate, in thicknesses of 0.064, 0.250, and 0.750 in. From the results, it was concluded that the ratios of bearing to tensile properties for the with-grain direction are essentially the same as proposed in N.A.C.A. T.N. No. 901, 920, 974, and 981 for other high-strength aluminum-alloy sheet and plate.

3d-58. Bearing Strengths of Some Aluminum-Alloy Rolled and Extruded Sections. R. L. Moore. *National Advisory Committee for Aeronautics, Technical Note* No. 1503, Sept. 1948, 17 pages.

Tests made to determine bearing yield and ultimate strengths for several sizes of rolled and extruded 14 S sections and of rolled 24 S-T and 75 S-T bar.

3d-59. The Effect of Single Addition Metals on the Recrystallization, Electrical Conductivity, and Rupture Strength of Pure Aluminum. R. H. Harrington. *American Society for Metals, Preprint* No. 15, 1948, 18 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 443-459.

An investigation with particular emphasis on the individual alloying effects of Fe, Mg, and Zr.

3d-60. "Diffuse Scattering" of the Fermi Electrons in Monovalent Metals in Relation to Their Electrical Resistivities. A. B. Bhatia and K. S. Krishnan. *Proceedings of the Royal*

Society, ser. A, v. 194, Aug. 12, 1948, p. 185-205.

The scattering coefficient depends on two factors: the atom-form factor for scattering and the structure factor of the crystal. Using data for these factors, the mean free path of the Fermi electrons is calculated for different directions of incidence, for one typical monovalent metal, namely, sodium. 23 ref.

3d-61. Plastic Flow Characteristics of Aluminum-Alloy Plate. L. J. Klingler and G. Sachs. *Journal of the Aeronautical Sciences,* v. 15, Oct. 1948, p. 599-604.

Commercial hot-rolled 1½-in. 24 ST aluminum plate possesses a marked degree of crystallographic anistropy. Tensile tests at various orientations showed that the yield strength is only slightly dependent upon the anistropy. 17 ref.

3d-62. Uber aushärtbare Aluminiumlegierungen mit Zink, Magnesium und Kupfer. (Heat Treatable Aluminum Alloyed With Zinc, Magnesium, and Copper.) K. L. Dreyer and H. J. Seemann. *Metall,* Jan. 1948, p. 6-11.

A heat treatable Al alloy with an average composition of 4.5% Zn, 1.5% Mg, 1.6% Cu, and 0.7% Mn shares in many respects the properties of duralumin. The proposed alloy has been tested for bending and tensile strength, elongation, and yield point.

3d-63. Influenza del vanadio sulle caratteristiche dell 'alluminio per uso elettrico. (Influence of Vanadium Additions on the Properties of Aluminum for Electrical Uses.) C. Panseri and M. Monticelli. *Alluminio,* v. 17, July-Aug. 1948, p. 335-338.

Confirms by experimental investigations that an increase in the content of vanadium increases markedly the electrical resistance of aluminum without influencing its mechanical properties.

3d-64. Coefficiente di temperatura della resistenza elettrica dell 'alluminio e delle sue leghe. (Temperature Coefficient of Electrical Resistance of Aluminum and Its Alloys.) F. Rohner. *Alluminio,* v. 17, July-Aug. 1948, p. 339-341.

Derives, on the basis of experimental results on pure aluminum and a series of its alloys, an empirical relationship.

3d-65. The Damping Capacity of Metals in Transverse Vibration. K. M. Entwistle. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 81-96.

Development of a method for measurement of damping capacity at low stresses on specimens of uniform cross-section vibrating transversely in the "free-free" mode. The damping capacity of Al-rich alloys ranges between 0.0022 and 0.0035%. The discrepancy between these values and those published by Frommer and Murray for specimens in torsional vibration is explained by the existence of transverse thermal currents in the former case. Changes of damping capacity during the aging of duralumin and R.R. 56 at room temperatures, following solution treating and quenching.

3d-66. Alpeth Cable Sheath. R. P. Ashbaugh. *Bell Laboratories Record,* v. 26, Nov. 1948, p. 441-444.

New type of cable sheath, a composite covering of aluminum, water-resistant cements, and polyethylene developed as a substitute for lead-alloy sheaths. Tests show excellent corrosion resistance and great superiority to lead in resistance to fatigue failure.

3d-67. The Bending Modulus of Rupture of Round Magnesium Tubing. C. H. Mortenson. *Journal of the Aeronautical Sciences,* v. 15, Nov. 1948, p. 661-664.

Bend tests were conducted on 28 round tubes of FS-1a and Ma magnesium alloy. Each alloy covered the d/t range from 20 to 75. Results are summarized empirically, and a formula is established for the minimum value of bending strength.

3d-68. Investigation of Resistance to Plastic Deformation at High Rate of Deformation. (In Russian.) L. D. Sokolov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics) v. 18, May 1948, p. 697-700.

Investigated for aluminum cylinders subjected to impact at an average velocity of 10,000 mm. per sec. During evaluation of dynamic resistance, the thermal effect was taken into consideration.

3d-69. Behaviour of Stressed Aluminium at Room Temperature. E. A. Owen, Y. H. Liu, and D. P. Morris. *Philosophical Magazine,* ser. 7, v. 39, Nov. 1948, p. 831-845; illustrations after p. 912.

Main purpose of the work described was to study, with the aid of X-rays, the behavior of aluminum—in a state of high purity, or containing pure elements, either soluble or insoluble—after the removal of stresses. The material was mainly in plate form, but powder and powder foils were also included, as well as filed and polished surfaces.

3d-70. Fracturing Characteristics of Aluminum-Alloy Plate. L. J. Klingler and G. Sachs. *Journal of the Aeronautical Sciences,* v. 15, Dec. 1948, p. 731-734.

Commercial hot rolled 1½-in., 24-ST Al plate exhibited large variations in fracture stress and reduction in area for different orientations of the test specimens. These variations were attributed to mechanical anisotropy. Measurement of the fracture angles indicated the presence of a plane of weakness, but no fracture function could be found to correlate this with fracture stresses and ductilities.

3d-71. Die Potentialbildung des Aluminiums in wässriger Kochsalzlosung. (The Development of an Electrical Potential on Aluminum in Aqueous Salt Solution.) Georg Masing. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 97-110.

The behavior of aluminum electrodes in buffered and unbuffered common-salt solutions. 21 ref.

3d-72. Uber die Oxydation von Magnesium und magnesiumlegierungen im fluessigen Zustand. (The Oxidation of Magnesium and Magnesium Alloys in the Molten State.) Walter Bulian. *Metallforschung,* v. 2, Feb. 1947, p. 62-64.

Results of experiments made to determine the ignition temperatures of freely flowing molten Mg and Mg alloys and the effects of alloying constituents.

3d-73. Plastic Flow of a Magnesium Alloy Under Biaxial Stresses. D. M. Cunningham, E. G. Thomsen, and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 546-553.

Previously abstracted from preprint. See item 3-216, 1947.

SECTION IV

CONSTITUTION AND STRUCTURE

4a—General

4a-1. Grain Growth. *Metal Industry,* v. 71, Nov. 14, 1947, p. 404; Nov. 28, 1947, p. 442, 449.

The importance of specimen thickness as shown by recent research. The importance of precipitated phases.

4a-2. Internal Stresses Arising From Transformations in Metals and Alloys. F. C. Thompson. *Engineering,* v. 164, Nov. 21, 1947, p. 499. Condensed from paper presented before Symposium on Internal Stresses in Metals and Alloys, London, Oct. 15-16, 1947.

A critical discussion.

4a-3. Recent Advances in X-Ray Analysis. Part I. X-Ray Analysis as a Method of Investigating the Arrangement of Atoms. Part II. Metals and Alloys. Part III. Organic Compounds. Lawrence Bragg. *Paint Technology,* v. 12, Nov. 1947, p. 421-425; discussion, p. 425-426.

Three lectures by Prof. Bragg are presented in condensed form by H. F. Clay.

4a-4. On the Deformation of Metals and Alloys. J. Ternisien. *Engineers' Digest* (American Edition) v. 4, Dec. 1947, p. 584-586. Translated and condensed from *La Metallurgie,* v. 79, April 1947, p. 7-10.

Structural changes taking place during deformation and their determination by X-ray and metallographic methods. The former are superior and the problem of interpretation of Debye-Scherer diagrams is sufficiently well understood to warrant application to industrial control.

4a-5. Solubility of Iron in Liquid Magnesium. David W. Mitchell. *Metals Technology,* v. 15, Jan. 1948, T. P. 2309, 9 pages.

Solubility is small but appreciable. The iron liquidus in the temperature interval investigated is in excellent agreement with published data on the Mg-Fe system. A eutectic structure which has not appeared in the literature and which occurs only under certain conditions of cooling was observed. 11 ref.

4a-6. Diffusion, Mobility and Their Interrelation Through Free Energy in Binary Metallic Systems. L. S. Darken. *Metals Technology,* v. 15, Jan. 1948, T. P. 2311, 11 pages.

Recent experimental evidence given by Smigelskas and Kirkendall (October issue) indicates that diffusivity of the components of metallic systems proceeds at different rates for each component, which theory differs from previous concepts. Equations are developed for calculating individual diffusivities and for the overall diffusivity of binary alloys. These equations were checked against experimental data and found to be in satisfactory agreement. 14 ref.

4a-7. X-Ray Diffraction Rings From Deformed Solid Metal and Metal Powders. W. A. Wood and W. A. Rachinger. *Nature,* v. 161, Jan. 17, 1948, p. 93-94.

Changes in structure of metals as a result of plastic deformation are often studied by X-ray diffraction, using filings, it being assumed that the same difference exists between the annealed and the plastically deformed state in the powder as in the bulk form. This assumption was examined experimentally for iron, and it was found that the diffraction rings from the filings were considerably broader in all cases than from the bulk specimens. A theoretical explanation is presented.

4a-8. On the Structure of Grain Boundaries in Metals. T'ing-Sui Ke. *Physical Review,* v. 73, Feb. 1, 1948, p. 267-268.

Results of a study of activation energy associated with viscous slip along grain boundaries in alpha brass, alpha iron, and aluminum. Values for energies associated with grain-boundary slip were close to diffusion values. If this is a general

phenomenon, it indicates that grain-boundaries slip involves the same mechanism as diffusion and that it is creep on a microscopic scale.

4a-9. The Metallography of Electrodeposited Surfaces. (Continued.) **The Physics of Grinding and Polishing. Part I. The Influence of Machining Stresses on a Metal.** A. T. Steer. *Electroplating,* v. 1, Jan. 1948, p. 91-102.

Fundamentals of metal-crystal structure as a preliminary to a consideration of the case of the effect of applied stresses (machining or otherwise) on a single metal crystal and the effect of such stresses on the massive metal.

4a-10. Absolute Reaction Rate Theory for Diffusion in Metals. J. C. Fisher, J. H. Hollomon, and D. Turnbull. *Metals Technology,* v. 15, Feb. 1948, T. P. 2344, 10 pages.

Birchenall and Mehl have analyzed the problem on the basis of an assumption that the net flux of diffusing material is proportional to a thermodynamic activity gradient. Eyring and coworkers have formulated the problem using the chemical rate theory. The authors have attempted to rationalize the inconsistencies between the two analyses and to analyze diffusion in substitutional alloys on the basis of the concepts of chemical rate theory. It is shown that the interstitial diffusion co-efficient of Birchenall and Mehl can be derived from the theory of absolute reaction rates. For diffusion of carbon in austenite, agreement between theory and experiment is good. Expressions for diffusion co-efficient were derived for both direct interchange and lattice-vacancy mechanisms in 2-component substitutional alloys. Experimental diffusion of zinc in brass supports the theory. 18 ref.

4a-11. Plastic Deformation and the Size of the Lattice Unit Cell. (In Russian.) B. M. Rovinskii and T. V. Tagunova. *Zhurnal Teknicheskoi Fiziki* (Journal of Technical Physics), v. 17, Oct. 1947, p. 1137-1142.

Results of experimental investigation of various metal and alloy powders annealed at different temperatures indicate that the size of the unit cell does not change as a result of plastic deformation. Therefore, phase transformations are not related to nonelastic changes in the size of cell nuclei. However, connection with preceding lattice distortion is believed possible. 12 ref.

4a-12. La Contribution de la Methode de Diffraction Eletronique a l'Etude de la Couche de Beilby. (Contribution of the Electron-Diffraction Method to the Study of the Beilby Layer.) R. Courtel. *Metaux et Corrosion,* v. 22, Oct. 1947, p. 157-167.

A critical review. The Beilby layer is defined as the amorphous, or vitreous, layer formed on the surface of a metal in polishing. 60 ref.

4a-13. The Partition of Molybdenum in Hypo-Eutectoid Fe-C-Mo Alloys. *Industrial Heating,* v. 15, Feb. 1948, p. 248.

Outlines paper by F. E. Bowman. (Presented at recent regional meeting, Pittsburgh Chapter, A.S.M.)

4a-14. Single Crystals—Part II. Lineage Characteristics — Production by Surfusion. *Metal Industry,* v. 72, Feb. 6, 1948, p. 106.

Discusses recent work on the above by Hibbard, and by Lacombe and Beaujard.

4a-15. Strain Sensitivity of Magnetic Susceptibility. T. S. Hutchison and James Reekie. *Physical Review,* 2nd Series, v. 73, March 1, 1948, p. 517-518.

Studies on the magnetic properties of cold worked metals have shown that magnetic susceptibility can be considerably affected by workhardening but this effect has been regarded as a secondary one, brought about by the presence of small amounts of ferrous impurities. However, during extensive experiments with Cu and Al of the highest purity, results have been obtained which indicate that marked changes in magnetic susceptibility exist which cannot reasonably be attributed to ferromagnetic impurities.

4a-16. History of Crystal Growth Revealed by Fractography. C. A. Zapffe, F. K. Landgraf, Jr., and C. O. Worden, Jr. *Science,* v. 107, March 26, 1948, p. 320-321.

Development of fractographic technique at Battelle Memorial Institute, Rustless Iron and Steel Corp., and in the laboratory of the senior author for Office of Naval Research. In the latter laboratory, the technique has been extended to elemental metals, alloys, and certain intercrystalline phenomena such as Neumann bands, as well as dissociation phenomena within inclusions. Fractographs of ammonium dihydrogen phosphate, molybdenum, chromium ferrite, and zeta silicon ferrite reveal much of the history of crystal growth. Each metal and alloy composition seems to have a highly characteristic pattern which can be used for identification and whose principal features are unalterable.

4a-17. An Experimental and Theoretical Investigation of Diffusion in a Two-Phase Alloy. Vera Daniel. *Proceedings of the Royal Society,* (Series A), v. 192, March 18, 1948, p. 575-592.

Results of an investigation of diffusion in the solid state. Previous experimental work has been confined to the case in which the free energy of a mixture is a minimum for the single-phase state, and diffusion decreases local differences of concentration. However, it is possible for the free energy to be a minimum for the two-phase state; diffusion may then increase differences of concentration. Becker has proposed a simple theoretical treatment of these two types of diffusion in a binary alloy. An experimental test of this theory, using the unusual properties of the alloy Cu_4FeNi_3 show results in fair agreement with conclusions drawn from Becker's theory. It was found that Fick's equation can, within the limits of error, be applied in all cases.

4a-18. Some Problems of the Metallic State. Lawrence Bragg. *Iron and Steel Institute, Special Report* No. 39, "Reports of the Affiliated Local Societies", Dec. 1947, p. 5-7. A condensation.

Factors which influence the behavior of metals from the point of view of the physicist. The structure of a metal is compared to a number of positively charged ball bearings, each coated with insulation in order to retain its charge, and immersed in a conducting liquid of corresponding negative charge. Models in which metal ions are represented by very small bubbles of air floating on the surface of a soap solution are used to represent fundamental phenomena of the metallic state, such as metal-deformation processes. (Presented at meeting of Swansea and District Metallurgical Society, Swansea, England, March 9, 1946.)

4a-19. Gases in Cast Metals. Michael B. Bever. *Iron Age,* v. 161, April 22, 1948, p. 90-94.

The theory of gas-metal interaction and behavior from the standpoints of unsoundness in castings, sources of gases in standard casting operations, solubility of the common gases in various metals and alloys, and factors governing this solubility. Information on control of the reacting and absorbed gases and on nonequilibrium conditions and other aspects of gas-metal behavior. 24 ref.

4a-20. Intermediarni Faze Kovovych Slitin. (Intermediate Phases in Metallic Alloys.) L. Jenicek. *Hutnicke Listy* (Metallurgical Topics), v. 3, Jan. 1948, p. 4-9; Feb. 1948, p. 37-41.

Discusses the concept of chemical phases in metallic systems and its development, the electronic theory of the metallic state, and difficulties encountered in defining the compounds present. 64 ref.

4a-21. On the Calculation of the Energy of a Bloch Wave in a Metal. J. Korringa. *Physica,* v. 13, Aug. 1947, p. 392-400.

General formulas for this calculation were obtained by application of the dynamical theory of lattice interferences to electron waves.

4a-22. On the Order-Disorder Transition in Solids. Part I and II. Yosio Muto. *Journal of Chemical Physics,* v. 16, May 1948, p. 519-525.

Theoretical, mathematical developments.

4a-23. Convenient Methods for Obtaining d/n Values From X-Ray Diffraction Patterns. C. B. Stewart and E. S. Lutton. *Journal of Applied Physics,* v. 19, May 1948, p. 507.

Theoretical consideration of instantaneous rate of grain growth in high purity Al and other materials.

4a-24. Influence of Molecular Interaction on Phase Equilibriums in Binary Systems. (In Russian.) V. I. Danilov and D. S. Kamenetskaya. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, Jan. 1948, p. 69-79.

A theoretical, mathematical development which indicates that the type of constitutional diagram of binary systems is determined by the bonding energy between similar and dissimilar molecules in the two phases present. Application to both metallic and organic-compound systems.

4a-25. Dependence of the Type of Constitutional Diagrams of Binary Alloys on Their Molecular Interaction. (In Russian.) D. S. Kamenetskaya. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, Jan. 1948, p. 81-89.

A geometrical method of thermodynamic potential analysis, calculated according to the method of Becker-Pines. Using the method of Rosenbum, different types of constitutional diagrams were investigated in the light of molecular interaction.

4a-26. A Note on Gaseous Thermal Diffusion: the Effect of a Third Component. John Chipman and Minu N. Dastur. *Journal of Chemical Physics,* v. 16, June 1948, p. 636-637.

In the reaction of hydrogen with oxygen dissolved in molten iron, a

controlled mixture of hydrogen and water vapor impinges upon the surface of the molten metal which is heated and also stirred by high-frequency induction. Thermal diffusion takes place near the hot metal surface, the result being a lower oxygen content of the metal than that corresponding to equilibrium. Admixture of argon minimized thermal separation in accordance with theory.

4a-27. Ist eine bearbeitete Metalloberflache feinstkristallin oder amorph? (Is a Worked Metal Surface Finely Crystalline or Amorphous?) Wolfgang Kranert and Heinz Raether. *Zeitschrift fuer Naturforschung,* v. 1, Sept. 1946, p. 512-513.

Surfaces of cold worked Se, Sb, and Bi are crystalline, although the structure is very fine.

4a-28. On the Structure of the High Temperature Metals. Russell Franks. *American Iron and Steel Institute, Preprint,* 1948, 24 pages.

Metals being used in development of jet engines, gas turbines, and other related high-temperature applications.

4a-29. Cobalt and Iron. I. Correlation of Transformation Mechanisms. *Metal Industry,* v. 72, June 11, 1948, p. 481, 487.

Discusses three recent papers.

4a-30. Transient Nucleation. David Turnbull. *Metals Technology,* v. 15, June 1948, T.P. 2365, 10 pages.

Nucleation theory developed by Volmer and Becker to transformations in condensed systems. Acceleration of the nucleation rate with time for the decomposition of austenite to pearlite. Increase in the nucleation rate during recrystallization may be explained on the same basis. 14 ref.

4a-31. Grains, Phases, and Interfaces: An Interpretation of Microstructure. Cyril Stanley Smith. *Metals Technology,* v. 15, June 1948, T.P. 2387, 37 pages.

Theory that many microstructures result from an attempted approach to equilibrium between phase and grain interfaces whose surface tensions geometrically balance each other at the points and along the lines where they meet. From this, a number of principles are derived which may be of interest to the metallographer and of practical use in explaining failures and in designing alloys for particular service. Limited to structures obtained after full annealing. 27 ref.

4a-32. Influence of Crystal Plane and Surrounding Atmosphere on Chemical Activities of Single Crystals of Metals. Allan T. Gwathmey, Henry Leidheiser, Jr., and G. Pedro Smith. *National Advisory Committee for Aeronautics, Technical Note* No. 1460, June 1948, 67 pages.

Influence of crystal plane of single crystals of 13 metals on rates of chemical processes important to the operation or manufacture of lubricated surfaces. These processes are oxidation in air, corrosion by oils; wetting of the surface by stearic acid with Cu, Ni, and Fe; rearrangement and roughening of the surface due to action of hot gases; and electrochemical processes including deposition, etching, replacement, and in a few cases, galvanic action.

4a-33. Recrystallization. E. C. Williams. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 75-81; discussion, p. 82-84. Based to a large extent on a recent paper by Maurice Cook and T. H. Richards.

Fundamental principles of recrystallization of cold worked metals.

4a-34. The Metallic State. Linus Pauling. *Nature,* v. 161, June 26, 1948, p. 1019-1020.

Resonating-valence-bond theory of the electronic structure of metals.

4a-35. Calculation of the Heat of Fusion of the Carbide and Silicide of Iron. (In Russian.) E. I. Akhumov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 21, March 1948, p. 227-234.

Calculations are presented, based on literature for melting points of the system Al-Si, Fe-FeSi, and Fe-Fe_3C. These values agree with those obtained by use of Le Chatelier's equation, if it is assumed that the silicide and carbide molecules each contain 6 atoms of iron in the liquid state: $(FeSi)_6$ and $(Fe_3C)_2$.

4a-36. X-Ray Diffraction Investigation of Minor Phases of 20 High-Temperature Alloys. B. M. Rosenbaum. *National Advisory Committee for Aeronautics, Technical Note* No. 1580, July 1948, 28 pages.

Use of X-ray diffraction methods to identify minor phases persent in the following high-temperature alloys in current use: 16-25-6, 17 W, 19-9 DL, Discaloy 25, S 590, N 155, K-42-B, Refractaloy 26, Nimonic 80, Inconel W, Inconel X, Inconel, Vitallium, 61, Stellite No. 6, 6059, 422-19, X-40, S 816, and Hastelloy B. 12 ref.

4a-37. Structure of Abraded Surfaces. J. B. Dance and D. J. Norris. *Nature,* v. 162, July 10, 1948, p. 71-72.

An investigation into the effect of

abrasion on hardness and microstructure of surface and subsurface layers in the fatigue of metals and alloys.

4a-38. Clustering Phenomena in Solid Solution. A. Opinsky and R. Smoluchowski. *Physical Review,* ser. 2, v. 74, Aug. 1, 1948, p. 343.

The fundamental principles of the phenomena, especially as applied to metallic solid solutions, and particularly to Ag-Cu alloys. Observed structures are explained on a theoretical basis; and it is stated that other metallic-solid-solution phenomena can be explained similarly, for instance the influence of silicon on the mechanism of deformation of alpha-iron, and the precipitation of Fe_4N from alpha-iron.

4a-39. Application of Dynamic Similarity to Metal Structures With Elastic and Plastic Flow. M. W. Thring. *Nature,* v. 162, July 31, 1948, p. 193-194.

In the attempt to attain dynamic similarity for fluid-flow systems, different dimensionless criteria appear according to whether momentum and viscosity, or momentum and gravity, are the dominant factors. Shows that a similar argument applied to the attempt to attain dynamic similarity for the flow of a metal structure gives two alternative dimensionless criteria according to whether momentum and elasticity or elasticity and plasticity are the dominant factors.

4a-40. Theory of Strain Interaction of Solute Atoms. C. Zener. *Physical Review,* ser. 2, v. 74, Sept. 15, 1948, p. 639-647.

The present study was undertaken for the purpose of understanding the strain interaction of interstitial solute atoms in body-centered cubic metals. Many of the problems encountered were found to be common to substitutional as well as to interstitial solutions. Primary emphasis is therefore placed upon the general theory.

4a-41. The Characteristics of Crystal Disintegration. (In Russian.) N. V. Belov and M. V. Klassen-Neklyudova. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, March 1948, p. 265-278.

The characteristics of differing crystals are mainly observed in the grain boundaries; therefore, these surfaces were given first attention in studying the characteristic geometrical lattices of various crystals. Both metallic and nonmetallic examples.

4a-42. Dislocation of Equilibrium During Crystallization of Solid Solutions. (In Russian.) D. A. Petrov. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 21, Dec. 1947, p. 1449-1460.

Results of a theoretical analysis of the transformation of fluid mixtures into solid solutions. Believes that the so-called "nonequilibrium solidus" has no validity, hence should not be used on constitution diagrams.

4a-43. Nucleation of Phase Transformations. J. C. Fisher, J. H. Hollomon, and D. Turnbull. *Metals Technology,* v. 15, Aug. 1948, T.N. 5, p. 2-3.

Two possible mechanisms which make possible the satisfactory description of all phase transformations in terms of nucleation and growth.

4a-44. Solubility of Metals and Generalized Momenta. (In Russian.) V. K. Semenchenko and P. P. Pugachevich. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, April 1948, p. 495-498.

Use of generalized momenta in solubility determinations, thus not only determining the concentration of electrons but also taking into consideration effective ionic radii which were completely ignored during previous attempts to substantiate the rule of Hume-Rothery. Graphical calculations using the method are presented for solubilities of Na, Au, Ag, As, Ca, Bi, Cu, and Si, in different metals.

4a-45. Short-Time High Temperature Deformation Characteristics of Several Sheet Alloys. James Miller and Glen Guarnieri. *American Society for Metals, Preprint* No. 35, 1948, 23 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 167-188; discussion, p. 188-193.

From short-time constant-rate tensile test at elevated temperature, true stress-strain characteristics were determined for five different types of alloys over a range of temperatures and strain rates. The alloys included S.A.E. 1020 steel as a reference material; regular Inconel to represent a comparatively stable annealed material; Inconel X, a fully-aged alloy; and S-816, both annealed and cold rolled, to represent an alloy susceptible to age hardening in both conditions. A simplified mechanism of deformation using these characteristics.

4a-46. The Solidification of Metals. E. Scheuer. *Foundry Trade Journal,* v. 85, Sept. 9, 1948, p. 245-248; Sept. 16, 1948, p. 273-276, 280.

Fundamentals of the solidification process and effects on casting prob-

lems. Shrinkage cavities and their control, properties, effects on mechanical properties, and effects of different grain sizes. 10 ref.

4a-47. The Constitution of Phases at High Temperature in Relation to Their Thermodynamic Properties. G. M. Willis. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 6 pages.

The concept of molecular species in relation to the properties of nonstoichiometric phases, and in relation to the use of the law of mass action in steelmaking equilibria. This law may take different forms, depending on whether the reaction is formulated in terms of molecules or ions. The validity of Raoult's law for basic slags is examined with reference to its implications as to the constitution of slags.

4a-48. Aspects of Gas-Metal Equilibrium, Interstitial Solution and Diffusion. R. M. Barrer. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 14 pages.

Equilibrium and kinetic aspects of interstitial solid solutions and conditions for forming such phases. A possible interpretation of the hardness and inertness of certain of these phases in terms of a theory of the metallic bond. Interstitial sorption equilibrium between gases and metals with particular reference to hydrogen "alloys".

4a-49. Nucleation of Slip Bands. J. G. Leschen, R. P. Carreker, and J. H. Hollomon. *Metals Technology,* v. 15, Sept. 1948, T.P. 2476, 8 pages.

A slip band is assumed to appear in a small, localized region of a stressed crystal and to change size at finite rates, rather than to appear suddenly in its entirety. Conditions required for the nucleation of a slip band are developed on the basis of a simplified picture, and their relations to the externally observed elongation of the crystal are pointed out. 13 ref.

4a-50. Transient Plastic Deformation. R. P. Carreker, J. G. Leschen, and J. D. Lubahn. *Metals Technology,* v. 15, Sept. 1948, T.P. 2477, 8 pages.

A simplified theory for the formation of slip bands in crystalline solids undergoing plastic deformation (T.P. 2476) predicts appearance of transients in the rate of strain of a crystal when the applied stress is suddenly changed from one constant value to another. Results of creep and tensile tests on Pb, Cu, and an Al alloy prove existence of these transients and indicate that cyclic loads or temperatures in creep tests produce greater strains than do constant conditions, unless duration of the transient effects is much less than the length of the cycle.

4a-51. A New Interpretation of Interstitial Compounds—Metallic Carbides, Nitrides and Oxides of Composition MX. (In English.) R. E. Rundle. *Acta Crystallographica,* v. 1, Sept. 1948, p. 180-187.

Interstitial monocarbides, mononitrides, and a few monoxides tend to have the sodium chloride structure irrespective of metal structure and radius. Interstitial phases are regarded as electron-deficient structures, where the nonmetal forms more bonds than it has bond orbitals. The concept of half-bonds is used to explain the structure, hardness, brittleness, conductivity, and high melting points of interstitial phases. 18 ref.

4a-52. The Electronic Structure of Solids. E. E. Schneider. *Science Progress,* v. 36, Oct. 1948, p. 614-632.

Theories presented under the headings: solids and atoms; the band theory of solids; cohesive forces and solid types; Fermi-Dirac statistics and metallic conduction; electron transfer effects; Hall effect and positive holes; periodic table and solid types; semiconductors; and color centers in alkali halides and impurity phosphors. 16 ref.

4a-53. Gas et Métaux. (Gases and Metals). Henry Lepp. *Le Vide,* v. 3, May 1948. p. 433-441.

The phenomena of absorption and adsorption of gas by metals from the physicochemical point of view. Different gas-metal systems were investigated by thermodynamic analysis in order to solve problems connected with their application in vacuum technique. 12 ref.

4a-54. Study of the Displacement of Suspended Additions During Crystallization. (In Russian.) I. N. Fridlyander and N. A. Vysotskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 71-73.

The senior author, in 1946, proposed a theory according to which the smaller size of metallic grains produced by more rapid rates of cooling is closely connected with the interactions of the crystals with any admixtures present. Such admixtures exert a mechanical pressure during crystallization which causes inhomogeneity of the resulting solid. An apparatus developed to measure this pressure and results of its application to an oxalic acid solution.

4a-55. Stable Transformation Nuclei in Solids. John N. Hobstetter. *Metals Technology,* v. 15, Oct. 1948, T.P. 2447, 10 pages.

A reconciliation of the Becker and Borelius theories of nucleation in solids. Both the critical size and critical concentration of a stable nucleus may be found. These conditions and the free-energy threshold for nucleation were determined for a pseudo-spherical nucleus formed by concentration in a simplified binary alloy crystal of the face-centered cubic type in which elastic energy accompanying nucleation is considered negligible.

4a-56. On the Theory of Vacancy Diffusion in Alloys. Frederick Seitz. *Physical Review,* ser. 2, v. 74, Nov. 15, 1948, p. 1513-1523.

Above theory is discussed in an attempt to interpret the experiments of W. A. Johnson on diffusion in gold-silver alloys. It is assumed that the lattice network preserves its identity during the diffusion even though there is a resultant vacancy current passing through any region. It is also assumed that two types of atoms are present in the lattice. The theory is also employed to interpret the experiments of Smigelskas and Kirkendall concerning relative displacement during diffusion of markers placed at the interface between copper and brass. An experiment providing an absolute test for vacancy diffusion is proposed.

4a-57. The Nature of the Temperature Minima of the Equilibrium Diagram of Binary Metallic Alloys. (In Russian.) V. N. Svechnikov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, May 1948, p. 679-686.

Bibliographic material concerning the nature of alloys, the equilibrium diagrams of which possess temperature minima. 14 ref.

4a-58. "Energy of Escape" of Metals. (In Russian.) L. N. Dobretsov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 727-752.

Modern theory of bond strengths in solids. Methods for determination of these values and factors influencing them. Several original equations. 40 ref.

4a-59. The Kinetics of Two-Phase (Eutectic) Crystallization. (In Russian.) B. Ya Pines. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 831-842.

Presents a theoretical analysis.

4a-60. Concerning Certain Critical States of Metals (In Russian.) N. F. Lashko. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, July 1948, p. 986-989.

Attempts to set up a general equation representing the breakdown of the lattice structure of metals under conditions of stress or temperature (fusion). Possibility of determining certain constants of lattice stability on the basis of this equation. Constants for the more common metallic atoms.

4a-61. Linear Atomic Chain and the Metallic State. T. A. Hoffmann and A. Konya. *Journal of Chemical Physics,* v. 16, Dec. 1948, p. 1172-1173.

Quantum mechanical analysis is applied to some fundamental problems of metallic structures.

4a-62. Uber die eutektische Kristallisation. (Eutectic Crystallization.) Erich Scheil. *Metallforschung,* v. 1, July-Aug. 1946, p. 1-11.

Comprehensive discussion of the subject. 35 ref.

4a-63. Das Gleiten der Metallkristalle. (The Slip Characteristics of Metal Crystals.) Ulrich Dehlinger. *Metallforschung,* v. 1, July-Aug. 1946, p. 11-17.

The atomic mechanism of slipping and the interaction of slipping and elastic deformation in multicrystalline plasticity. 25 ref.

4a-64. Valenzverbindungen in metallischen Systemen. (Valence Bonds in Metallic Systems.) Hans Nowotny. *Metallforschung,* v. 1, July-Aug. 1946, p. 35-38.

Difference between true intermetallic bonds and bonds of the salt type, as in NaCl. Boundary between the two types is not sharp, and many compounds are bound together by forces of a mixed character between the saltlike Li_2O and the metallic Mg_2Pb.

4a-65. Das Dreistoffsystem Gold-Nickel-Kupfer. (The Ternary Gold-Nickel-Copper System.) I. Ernst Raub and Annemarie Engel. *Metallforschung,* v. 2, Jan. 1947, p. 11-16.

The investigation covers alloys containing 86.2% Au, 98.0% Ni, and 80% Cu as maxima.

4a-66. Uber den Einfluss dritter Elemente bei der Diffusion in Metallen. (Study on the Influence of Third Elements by Diffusion in Metal.) Johanna Hauk. *Metallforschung,* v. 2, Feb. 1947, p. 49-56.

An extensive review of the literature of the effects of third elements on C, N_2, P, Mn, Ni, Cu, Be, and Zn in iron; of C on the diffusion of B, Co, H_2, Mo, S, Si, Ti, V, and W

in Fe; and of Mg in Al, Cu in Al, Cu in Ni, and Cu in Zn. 56 ref.

4a-67. Ubersicht uber die Rekristallisationserscheinungen mit Hilfe einer neuen Hypothese. (Survey of Recrystallization Phenomena With Aid of a New Hypothesis.) Cord Petersen. *Metallforschung,* v. 2, Oct. 1947, p. 289-304.

Assumes, as a working hypothesis, that grain growth is caused by the elastic energy of an inherent stress condition, which, in turn, is the result of crystalline, and especially, polycrystalline plasticity. This hypothesis explains most recrystallization phenomena and is in agreement with experimental results. 58 ref.

4b—Ferrous

4b-1. Hydrogen in Steel. J. H. Andrew, H. Lee, H. K. Lloyd, and N. Stephenson. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 580-590; discussion, p. 622-625.

Investigation of the relationship between evolution of hydrogen and transformation characteristics of the steel as well as the occurrence of defects such as cracks, flakes, and "fisheyes". Effect on mechanical properties.

4b-2. Steel Manufacture. C. Sykes, H. H. Burton, and C. C. Gegg. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 591-598; discussion, p. 622-625.

Investigation of the relationships between hydrogen in steel and hairline crack formation. The hydrogen contents of steels at different stages of manufacture, i.e., liquid steel, ingots, billets, forgings, etc., were determined and the results discussed in terms of various theories. Includes a discussion of diffusivity based on theory and experiment.

4b-3. Elastic Relaxation and Some Other Properties of the Solid Solutions of Carbon and Nitrogen in Iron. L. J. Dijkstra. *Philips Research Reports,* v. 2. Oct. 1947, p. 357-381, 399-400.

The theory of elastic relaxation in alpha iron caused by carbon and nitrogen in solid solution predicts a strong anisotropy for the various crystal directions. This conclusion was confirmed by a series of experiments on single crystals of iron. The theoretical absolute magnitude of the effect for carbon. The most probable place of the dissolved particles in the iron lattice. The rate of segregation taking place at 20° C. in the form of carbides or nitrides was determined by measuring the decrease in magnitude of elastic relaxation with time. 19 ref.

4b-4. Effects of Alloying Elements on the Microstructure and Properties of Steel. John M. Hodge. *Steel Processing,* v. 33, Dec. 1947, p. 746-750.

Effects of 17 alloying elements.

4b-5. Spheroidization of Molybdenum Steel in High Temperature Service. R. F. Miller, E. V. Golaszewski, and G. V. Smith. *Metal Progress,* v. 53, Jan. 1948, p. 83-86.

Spheroidization, but not graphitization, was observed during exposure at 1000 to 1300° F. over periods up to 5000 hr. for normalized specimens of 0.14% C, 0.53% Mo steel of fine-grain deoxidation practice.

4b-6. The Effect of Hydrogen on the Ingot Structure of Killed Steels. *Industrial Heating,* v. 15, Jan. 1948, p. 84.

Summarizes paper by B. R. Queneau, presented at recent Seminar on Ingot Structure of the A.I.M.E., Chicago. Results of experimental work in which an ingot of S.A.E. 4140 steel was treated with hydrogen by means of a lance. The ingot was rolled and the microstructure was compared with other ingots from the same heat.

4b-7. Essai de Détermination de la Dimension Moyenne des Particules de Cementite Contenues dans les Divers Constituants d'un Acier Ordinair. (Attempt to Determine the Average Dimensions of Cementite Particle Contained in Various Constituents of Ordinary Steel). Pierre Borbaud. *Comptes Rendus* (France), v. 225, Nov. 10, 1947, p. 875-876.

X-ray diffusion was used to examine electropolished samples. In photometric determination of the pearlite and sorbite it was found that microparticles of cementite were also present.

4b-8. Graphitization and Failure of Steel in Service. *Welding Journal,* v. 27, Jan. 1948, p. 29s. Reprinted from *Tempil Topics,* Dec. 15, 1947.

Methods for prevention under high-pressure and high-temperature conditions.

4b-9. Graphitization of White Cast Iron; Effect of Section Size and Annealing Temperature. Richard Schneidewind, D. J. Reese, and A. Tang. *American Foundrymen's Assoc., Preprint No.* 47-7, 1947, 7 pages.

4b-10. An Interpretation of the Constitution of Iron-Carbon-Silicon Alloys. J. E. Rehder. *American Foundrymen's Assoc., Preprint No.* 47-11, 1947, 3 pages.

4b-11. Isothermal Transformation of Molybdenum Cast Iron. Charles Nagler and Ralph L. Dowdell. *American Foundrymen's Association, Preprint* No. 47-17, 1947, 16 pages.

Investigates above by metallographic methods and by a rapid magnetic method. Both methods correlate quite well. Molybdenum cast irons investigated did not have a simple typical "S" curve. They showed deep hardenability in the temperature range 900 to 1300° F. indicating the possibility of heat treating comparatively heavy sections. Hardenability as determined by the end-quench-type test correlated well with results determined on a 1-in. round.

4b-12. Graphite Phase in Gray Cast Iron. Robert W. Lindsay. *American Foundrymen's Assoc. Preprint* No. 47-30, 1947, 11 pages; discussion, p. 10-11.

Factors affecting the development of the above and the relationship of this structure to the properties of this group of alloys. Summary suggests the relationship of the properties of cast iron to the graphite structure. 22 ref.

4b-13. Microstructure of Silvery Pig Iron. Richard Schneidewind and Carl Harmon. *American Foundrymen's Assoc., Preprint* No. 47-31, 1947, 4 pages.

Etchants and X-ray diffraction method used.

4b-14. Segregation in Small Steel Castings. H. F. Bishop and K. E. Fritz. *American Foundrymen's Assoc., Preprint No.* 47-46, 1947, 12 pages.

As shown by experimental work.

4b-15. Self-Diffusion in Iron. C. Ernest Birchenall and Robert F. Mehl. *Journal of Applied Physics,* v. 19, Feb. 1948, p. 217-218.

Rates of self-diffusion in alpha and gamma-iron were determined by use of radioactive tracer techniques in the ranges 715 to 887° C., and 935 to 1112° C., respectively.

4b-16. Method of Phase (Carbide) Analysis of Steel. (In Russian.) S. M. Gutman. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1403-1412.

New method which permits determination of the qualitative distribution of the carbon and metal between carbides and solid solutions under any annealing conditions. The method may be used in control of heat treatment of steel.

4b-17. Subzero Transformation of Austenite. R. H. Hays. *Metal Progress,* v. 53, March 1948, p. 374-375.

Two photomicrographs which won the grand prize in the 1947 A.S.M. metallographic exhibit show the metal as quenched from 2250° F. and the identical area after cooling to −110° F.

4b-18. Transformation of S.A.E. 6115 Steel During Continuous Cooling. C. A. Liedholm, A. I. Rush and W. C. Coons. *Metal Progress,* v. 53, March 1948, p. 392-B.

Diagram includes typical photomicrographs in circle form.

4b-19. Some Thermodynamical Aspects of the Formation of Inclusions in Mild Steel Weld Metal. E. C. Rollason and E. Bishop. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 161-168.

A method of thermodynamic analysis and its development and application to published analyses of nonmetallic inclusions in mild steel arc weld deposits. Inclusions analyzed at room temperature and also those calculated to exist at the freezing point are plotted on a ternary SiO_2-FeO-MnO diagram from which can be deduced the change in inclusion composition during cooling from the freezing point. A method has been evolved whereby types and amounts of inclusions in many weld metals can be determined from the FeO content of the slag and the total Mn and Si contents of the weld metal.

4b-20. Micro-Examination and Electrode Potential Measurements of Temper-Brittle Steels. D. McLean and L. Northcott. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 169-177.

Microstructure and impact strength of five alloy steels after various tempering treatments were correlated, using as etching reagents solutions of picric acid with and without surface-active compounds. In all specimens embrittled either by slow cooling or by re-tempering at intermediate temperatures, grain boundaries could be revealed much more plainly than in tough specimens of the same composition, and fracture followed the boundaries. Fractures of specimens broken at liquid-air temperature to produce intergranular fracture were examined at high power, but no difference could be detected between "tough" and "brittle" specimens to suggest an intergranular precipitate in the latter. Electrode-potential measurements on similar fractures did show differences seemingly related to grain-boundary composition.

4b-21. A Magnetic Study of Phase-Change Processes in Iron-Silicon Alloys. K. M. Guggenheimer, H. Heitler, and K. Hoselitz. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 192-199.

Measurement of variation of mag-

netic saturation intensity with temperature was used to investigate the above alloys. Three magnetic phases were found and their boundaries determined. A quantitative method of magnetic analysis was used to investigate various phase-change processes and their dependence on time and temperature. 13 ref.

4b-22. A Study of the Transition From Shear to Cleavage Fracture in Mild Steel. Harmer E. Davis, Earl R. Parker, and Alexander Boodberg. *A.S.T.M., Advance Print* AP3, 1947, 19 pages; discussion, p. 18-19.

Results of tests on unnotched cylindrical tension bars, 3-in. wide flat bars with saw-cut notches in each edge, and 12-in. wide plates with a central notch at the midsection. The mechanism of fracture in relation to variation in shear and cleavage strength with temperature and to the state of stress as induced by notching or deformation.

4b-23. Diffusion of Carbon in Austenite. (In Russian.) M. E. Blanter. *Zhurnal Tekhnickeskoi Fiziki* (Journal of Technical Physics), v. 17, Nov. 1947, p. 1331-1340.

A new method for determination of the diffusion constant. A formula for the above diffusion as a function of carbon concentration and temperature is derived from a study of experimental data. This formula has a maximum error of 7.5 to 8.0%. 10 ref.

4b-24. Heterogeneity of Steel Ingots and Their Crystallization. (In Russian.) V. A. Davidenkov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1683-1703.

Factors which indicate directly or indirectly the presence of heterogeneity were investigated on several ingots produced by different methods. Relationships between content, number, and dimensions of inclusions; mechanical properties; toughness; and microstructures were established. Conclusions concerning the mechanism of crystallization. 39 ref.

4b-25. Final Progress Report; Fundamental Investigation of Graphitization of Piping. L. E. Hankison, T. E. Purcell, and Alex D. Bailey. *Edison Electric Institute Bulletin,* v. 16, Feb. 1948, p. 43-44; also "Issues Final Report on Study of Graphitization of Piping" (same authors). *Heating, Piping & Air Conditioning,* v. 20, Apr. 1948, p. 76-77.

Results obtained at Battelle Memorial Institute since March 1947, involving: continued tests at 1125° F. of previously tested materials which had indicated good resistance to graphitization; and further effort to evaluate the influence of elastic stress and plastic deformation on graphite formation. Alloys investigated were as follows; plain-carbon, low-Al steel; C-Mo, low-Al, steel G-18; C-Mo, low-Al, Steel G-19; C-Mo, Si-deoxidized steel; C-Mo, Ti-deoxidized, ½-2½%-Cr steel; ½-1%-Mo steel; and Mo-V steel.

4b-26. The Formation of Sigma Phase in Duplex Chromium-Nickel-Molybdenum Corrosion-Resisting Steels. H. W. Kirkby and J. I. Morley. *Journal of the Iron and Steel Institute,* v. 158, March 1948, p. 289-294.

Results of an investigation of sigma formation in two 18-8 steels, containing Mo and Ti in the one case and Mo and Cb in the other. Time-temperature studies showed that sigma forms very rapidly at 850° C. in both these alloys with accompanying increase in hardness, loss of magnetism, and decrease in ductility. They also suggest that the formation of sigma causes alloy depletion locally, which may have an effect on corrosion resistance in certain circumstances. A detailed study was made in regard to changes in microstructure accompanying sigma formation, using etching reagents designed to distinguish sigma from ferrite, austenite, and carbide.

4b-27. The Production of Nodular Graphite Structures in Cast Iron. H. Morrogh and W. J. Williams. *Journal of the Iron and Steel Institute,* v. 158, March 1948, p. 306-322.

Additions of Ce resulted in nodular structures in hypereutectic alloys even with very low Ni contents. Attempts to produce nodular structures by adding Ce to low-sulphur, hypo-eutectic, cast irons were only partially successful, but when hypereutectic irons were treated, structures consisting of hypereutectic spherulites and quasi-flake graphite were obtained. The influence of sulphur upon the Ce treatment and general composition requirements for the production of nodular structures in the as-cast state. The mechanism of solidification of these irons. When the number of hypereutectic nodules is increased artificially, no quasi-flake graphite forms. A process for accomplishing this involving addition of a graphitizing inoculant after the Ce addition. Mechanical properties

are very good. Ce may be added in the form of "mischmetall". 20 ref.

4b-28. The Occurrence and Some Effects of Sigma Phase in a Molybdenum-Bearing Chromium-Nickel Austenitic Steel. L. Smith and K. W. J. Bowen. *Journal of the Iron and Steel Institute,* v. 158, March 1948, p. 295-305.

The existence of a hard, brittle, nonmagnetic phase, analogous to the compound FeCr, and called the sigma phase, was confirmed in 18-8-3-1 Cr-Ni-Mo-Ti steel. It is shown that when this steel is reheated in the range 500 to 970° C., the sigma phase is formed from the ferrite. The formation of the sigma phase and its effect on mechanical properties and corrosion resistance. The investigation was aided by development and use of an instrument, the "Ferrometer", which enables changes in ferromagnetism in a steel to be followed and measured. X-ray crystallography and microscopic examination were used to survey the microstructure from 500 to 1150° C. In addition, the mode of formation of sigma from ferrite at 850° C. was explored.

4b-29. Influence of Grain Size on Diffusion of Nitrogen. (In Russian.) A. G. Andreeva, I. E. Kontorovich, and A. A. Sovalova. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1521-1526.

It is shown that diffusion of nitrogen into iron increases with grain size. The maximum depth of diffusion of nitrogen is observed after the critical degree of deformation and recrystallization takes place. Depending on grain size, the depth of the diffusion layer increases from 0.26 to 0.60 mm.

4b-30. Fractographic Studies of Ferro-Chromium Alloys. C. A. Zapffe. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 105-108.

A condensation. Previously abstracted from *Revue de Metallurgie,* v. 44, March-April 1947, p. 91-96. See item 4-209, R.M.L., v. 4, 1947.

4b-31. Nodular Graphite Structures Produced in Gray Cast Irons. H. Morrogh. *American Foundryman,* v. 13, April 1948, p. 91-106.

See abstract of: "The Production of Nodular Graphite Structures in Cast Iron", H. Morrogh and W. J. Williams, *Journal of the Iron and Steel Institute,* v. 158, March 1948, p. 306-322, item 4b-27, (Presented at 52nd annual meeting, A.F.A., Philadelphia, May 3-7, 1948.) (Also published as A.F.A. Preprint No. 48-46.)

4b-32. Ferromagnetic Structure of Cold Worked Austenitic Stainless Steels. P. T. Hobson and W. P. Osmond. *Nature,* v. 161, April 10, 1948, p. 562-563.

As a result of research on magnetic recording, a new theory is proposed. The idea of a dispersion of ferrite particles, probably long in relation to their cross-section, and of individual volumes of the order of a single domain, in a nonmagnetic matrix of austenite, is supported by experimental evidence.

4b-33. The Carbides in Iron—Carbon—Silicon Alloys and Cast Irons. D. Marles. *Journal of the Iron and Steel Institute,* v. 158, April 1948, p. 433-436.

Results of a metallographic study with Si contents up to 7% and C contents of 1.7 to 3.6%. It was found that with silicon contents in excess of about 2.5%, a carbide phase appears which does not respond to heat-tinting in the same way as normal cementite. With increase in Si up to 7% this phase increases in amount, while the cementite phase decreases until at 7% the carbide phase is a silico-carbide. It has a lower stability at elevated temperatures than normal cementite.

4b-34. Carbide Precipitation in 25-20. David A. Vermilyea. *Metal Progress,* v. 53, May 1948, p. 692.

Photomicrographs show a section from a Type 310 (25-20 Cr-Ni) stainless-steel tube which has been in service at 930° F. for approximately 3000 hr. A specimen from this tube was exposed 50 hr. to a boiling H_2SO_4-$CuSO_4$ solution. No grain-boundary penetration occurred and the specimen withstood a full 180° bend without failure.

4b-35. Unusual Structures Observed in Gray Cast Irons of High Sulphur Content. J. E. Rehder. *American Foundryman,* v. 13, May 1948, p. 91-93.

In a commercial gray-iron foundry, cast iron of high sulphur content was produced by accident on two occasions. Subsequent examinations revealed unusual microstructures and reactions to heat treatment.

4b-36. Influence of Boron on the Structure of High-Speed Steel. (In Russian.) A. K. Shevelev. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Jan. 1948, p. 99-104.

Addition of boron contributes to the retaining of residual austenite in tempered steel, the amount of which increases with boron content. Furthermore, the addition of boron contributes to the regrouping of carbides.

4b-37. Nodular Graphite; Production in Cast Iron. H. Morrogh and W. J.

Williams. *Iron and Steel,* v. 21, May 13, 1948, p. 208-214; discussion p. 266-268.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Mar. 1948, p. 306-322. See item 4b-27, 1948.

4b-38. Carbides; Occurrence in Iron-Carbon-Silicon Alloys and Cast Irons. D. Marles. *Iron and Steel,* v. 21, May 13, 1948, p. 215-217; discussion p. 266-268.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Apr. 1948, p. 433-436. See item 4b-33, 1948.

4b-39. Nonmetallic Inclusions; A Micro-Examination of Eight Steels. J. H. Whiteley. *Iron and Steel,* v. 21, May 13, 1948, p. 237-241; discussion, p. 272-275.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 157, Sept. 1947, p. 89-97. See item 4-172, R.M.L., v. 4, 1947.

4b-40. Mild Steel Weld Metal; Some Thermodynamical Aspects of the Formation of Inclusions. E. C. Rollason and E. Bishop. *Iron and Steel,* v. 21, May 13, 1948, p. 246-248; discussion, p. 272-275.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 161-168. See item 4b-19, 1948.

4b-41. Contributo allo Studio della Morfologia delle Inclusioni non Metalliche nei Prodotti Siderurgic. Inclusioni nel Ferro Puro Industriale. (Contribution to the Study of the Morphology of Nonmetallic Inclusions in Ferrous Materials. Inclusions in Commercial Iron.) Raffaello Zoja. *La Metallurgia Italiana,* v. 39, Nov.-Dec. 1947, p. 267-280.

Results of investigation of 99.9% Fe produced on a semicommercial scale with regard to the frequency, distribution, and grouping of the different types of nonmetallic inclusions. Electrolytic, Armco, and "Ferrital" irons were also investigated.

4b-42. L 'Ossigeno nell' Acciaio. (Oxygen in Steel.) Adolfo Antonioli. *La Metallurgia Italiana,* v. 39, Nov.-Dec. 1947, p. 289-293.

An article by Castagneri, and also the work of several other investigators regarding the oxygen equilibria in steel and methods for its determination, are critically analyzed.

4b-43. Graphitization of Low-Carbon Low-Alloy Steel—an Appraisal of the Literature. G. V. Smith. *Welding Journal,* v. 27, June 1948, p. 277s-284s.

Various investigations reported since 1943. 30 ref.

4b-44. Melting Points of Iron Oxides on Silica; Phase Equilibria in the System Fe-Si-O as a Function of Gas Composition and Temperature. L. S. Darken. *Journal of the American Chemical Society,* v. 70, June 1948, p. 2046-2053.

The stable phases under various conditions of temperature and gas composition for the ternary system Fe-Si-O. The data were used to interpret the migration of silica through iron oxide to the scale-metal interface during the scaling of steel. 15 ref.

4b-45. How Atmospheric Nitrogen Encourages Galling and Fatigue Failures. H. Schottky and H. Hiltenkamp. *Steel,* v. 123, July 5, 1948, p. 97, 110, 113-114. Translated from the German.

Severe local friction of steel parts resulting in galling also leads to absorption of nitrogen from the atmosphere. This causes brittleness, which results in cracks leading to fatigue failures. Metallographic indication of increased nitrogen content, and its confirmation by chemical analysis, using a special sampling technique. Observations on a badly worn gear coupling and on a broken Cr-Ni-steel shaft confirm the nitrogen absorption. 11 ref.

4b-46. The Formation of Crystals of Spectroscopically Pure Iron. D. Luther Phillips. *Research,* v. 1, July 1948, p. 479-480.

Formation of crystalline deposits on the surface of mild steel rods on heating for four days at 1000° C. in a horizontal position in sealed, evacuated silica tubes. The crystals were found to be aggregates of spectroscopically pure alpha iron.

4b-47. The Decomposition of Austenite by Nucleation and Growth Processes. Robert Franklin Mehl. *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 113-129.

In considering the kinetics of the reactions responsible for this decomposition (formation of ferrite, carbide, pearlite, and bainite), both rate and morphology were studied by isothermal reaction. Isothermal transformation diagrams for various steels; rate of nucleation and growth as a function of temperature; diffusion coefficient of carbon in austenite as a function of carbon concentration; extrapolation of GS and ES curves for Fe-C alloys; interlamellar spacing of pearlite as a function of undercooling; observed and calculated rates of growth of pearlite. 51 ref.

4b-48. A Study of the Hydrogen, Oxygen, and Nitrogen Contents of Found-

ry Pig-Iron. J. E. Hurst and R. V. Riley. *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 130-136.

Results of a survey in samples of foundry pig iron from a number of British sources. A comparison was also made between recently cast pig iron and samples cast 25 years previously, from the same manufacturer. The determinations were made by the vacuum-fusion method, and substantial differences in hydrogen, oxygen, and nitrogen contents were recorded for the various types. Compositions were determined by chemical and spectrographical analysis with special attention to residual or minor elements.

4b-49. Influence of Chromium on Graphitization of White Cast Iron. Gabriel Joly. *American Foundryman,* v. 14, July 1948, p. 60-64.

Official exchange paper of French Foundry Technical Association presents results of experimental work performed in order to determine the annealing cycles necessary to obtain, for a series of Cr contents from 0.032 to 0.137%, an iron having ferritic-nodular graphitic structure.

4b-50. Dispersion Hardening of High-Alloy Austenite as Factor of Its Heat Resistance. (In Russian.) A. M. Borzdyka. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences.), no. 2, March-April 1948, p. 153-160.

Processes of dispersion solidification of metallic gamma solid solutions of the systems Fe-Cr-Ni and Fe-Cr-Mn in connection with their mechanical strength at high temperatures. Principles of rational utilization of such processes during the practical application of austenitic alloys under conditions of creep at high temperatures. 10 ref.

4b-51. Current Theories of the Hardening of Steel—50 Years Later. J. B. Austin. *Metal Progress,* v. 54, Aug. 1948, p. 201-208.

Brings up to date the ever-current topic of the theory of the hardening of steel.

4b-52. Effects of Boron Additions on Malleabilization of White Cast Iron. J. E. Micksch, H. A. Fabert, Jr., and G. M. Cover. *American Foundryman,* v. 14, Aug. 1948, p. 30-37.

Micrographic data on the additions of boron in minute quantities to counteract the stabilizing effect of chromium on the malleabilization of white cast iron. Phase diagrams and results of investigation. 13 ref.

4b-53. The Application of Columbium (Nb) to the Continued Toughness of Chrome-Molybdenum Steels at 1022°F. (In Russian.) Ya. S. Gintsburg, K. A. Lanskaya, and A. V. Ctanyukovich. *Kotloturbostroenie,* (Boiler and Turbine Manufacture), Jan.-Feb. 1948, p. 17-19.

Application of columbium to the resistance of various chromium-molybdenum steels containing 2 to 7% Cr and 0.5% Mo. Toughness of the given steels at 1022° F.

4b-54. Nodular Cast Irons, Their Production and Properties. H. Morrogh and J. W. Grant. *Foundry Trade Journal,* v. 85, July 8, 1948, p. 27-34; July 15, 1948, p. 51-57; July 22, 1948, p. 81-86.

Mechanical properties of typical nodular irons and the commercial production of the material. (To be continued.)

4b-55. Steels for Forging. Part III. The Nickel-Chrome Alloys. Lester F. Spencer. *Steel Processing,* v. 34, Aug. 1948, p. 427-431.

Relation of composition to forging with particular reference to "flaking". Includes data on heating cycles for specific grades of Ni-Cr steels, mechanical properties of Cr-V steel forgings, and properties of some forged Ni-Mo and Ni-Cr-Mo steels. (To be continued.)

4b-56. Influence of Low Temperatures on the Mechanism of the Austenite-Martensite Transformation. Jozef Mazur. *Nature,* v. 162, July 31, 1948, p. 184-185.

Results of systematic investigations by X-ray diffraction methods of the influence of low temperatures on the lattice parameter of austenite and martensite and on the axial ratio c/a in martensite using two plain carbon steels containing 0.89 and 1.2% carbon, respectively.

4b-57. Investigation on Dissolved Gases in Cast Iron. J. E. Hurst. *Pig Iron Rough Notes,* Spring-Summer, 1948, p. 4-7.

Results of observations on gases evolved on solidification of molten pig iron and the influence of casting temperature on the CO_2, CO, H_2 and N_2 content. (To be continued.)

4b-58. Equilibrium of Iron-Carbon-Silicon and of Iron-Carbon-Manganese Alloys With Mixtures of Methane and Hydrogen at 1000°. Rodney P. Smith. *Journal of the American Chemical Society,* v. 70, Aug. 1948, p. 2724-2729.

The carbon content of several Fe-Si alloys (1.2-15% Si) and of a num-

ber of Fe-Mn alloys (4.0-14.5% Mn) in equilibrium with various mixtures of CH_4 and H_2 of known composition at 1000° was determined. For the silicon alloys the measurements covered both the austenite and the ferrite regions. The activity of carbon relative to graphite is given for each system. Phase boundaries in a portion of each of the two three-component systems. 16 ref.

4b-59. Y a-t-il une liaison entre graphitisation, vieillissement, flocons, fragilité de revenu? (Is There a Relationship Among Graphitization, Aging, Flakes, and Temper Brittleness?) G. Dague and A. Tabary. *Revue de Métallurgie,* v. 45, May-June 1948, p. 147-159; discussion, p. 159.

As a result of consideration of the literature and experimental data which are presented, the authors conclude that the above phenomena in steel are related. Discusses the accident of Jan. 1943 at the Springdale Power Station of the West Penn Power Co. The four phenomena are shown to be related to heat treatment below Ac_1 and to time at critical temperature (usually between 200 and 600° C.). They are more pronounced in fine-grained steels and represent different aspects of the transition of $Fe-Fe_3C$ into Fe-graphite. 38 ref.

4b-60. The Effect of Grain Size on the Martensite Transformations. W. J. Barnett and A. R. Troiano. *Metals Technology,* v. 15, Aug. 1948, T.N. 4, p. 1-2.

The existence of a grain size stabilization effect on martensitic-type reactions as shown by Scheil in an Fe-29%-Ni alloy and by Troiano and Tokich in cobalt prompted a review of other martensitic reactions to determine if this stabilization effect is characteristic. Preliminary work shows this effect to be present both in the gamma to epsilon transformation in an Fe-20%-Mn alloy and the martensite transformation of S.A.E. 4140 and 3%-Cr, 0.40%-C steel. No appreciable effect was found in an S.A.E. 2340 steel.

4b-61. The Effect of Chromium on the M_s Point. J. B. Bassett and E. S. Rowland. *Metals Technology,* v. 15, Aug. 1948, T.P. 2417, 8 pages.

Results reported for steels containing 0 to 2% Cr indicate that the above effect is not strictly additive as was indicated by previous work. Results also show that there is no abrupt decrease in the M_s point with increasing Cr, which might lead to an explanation of the occasional stress cracking of S.A.E. 52100 steel during commercial hardening treatments.

4b-62. The Origin of Silicate Inclusions in Basic Electric Arc Furnace Steel of Higher Carbon Contents. Axel Hultgren. *Metals Technology,* v. 15, Aug. 1948, T.P. 2418, 28 pages.

Swedish research on a carbon steel with 1.10% Co, and on a spring steel with 0.65% C, 0.70% Si, and 1.0% Mn, to determine conditions for formation of inclusions during tapping and pouring, effects of time in ladle, and value of methods for diminishing the amount of inclusions. By use of a Caspersson ladle and pouring under nitrogen, inclusion contents as low as 0.02×10^{-3} vol. per cent were obtained. Results indicate that growth of silicate inclusions before freezing of the steel in the mold is caused by precipitation from solution and diffusion and not from coalescence of small drops. 20 ref.

4b-63. Mechanism of Eutectic Dissociation of Austenitic Alloys. (In Russian.) M. E. Blanter. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, April 1948, p. 529-540.

Mehl's theory of eutectic dissociation is shown to be erroneous. A new mechanism is proposed and verified experimentally. A series of Cr, Ni, and Co alloy steels having a stable cementite structure were studied. 28 ref.

4b-64. Changes in the Physical Properties and Structures of Annealed Hyper-Eutectoid Steels as a Basis of a Magnetic Method of Control. (In Russian.) Ya. R. Rauzin and Sh. R. Zheleznyakova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 817-823.

Attempts to establish relationships between the basic magnetic characteristics: magnetic permeability, coercive force, and physical properties and structure. Magnetic method for control of structure based on these relationships.

4b-65. Os Pseudo-Flocos nos Acos Rapidos. Sua Origem e Seu Efeitos sobre a Dureza de Tempera Desses Acos (Pseudo Flakes in High-Speed Steels. Their Origin and Effect on the Temper Hardness of Such Steels). Eros Orosco. *Boletim da Associacao Brasileira de Metais,* v. 4, July 1948, p. 300-332.

Results of investigation. A general theory of their origin based on the literature and on the data presented. 14 ref.

4b-66. The Isothermal Decomposition of Martensite and Retained Austenite.

B. L. Averbach and Morris Cohen. *American Society for Metals, Preprint* No. 1, 1948, 35 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1024-1057; discussion, p. 1057-1060.

Rates of transformations were determined by means of X-ray and precision length measurements. The austenite-martensite reaction on hardening does not stop sharply when cooling stops and as much as 5% of retained austenite may transform isothermally into martensite at room temperature.

4b-67. The Transformation and Retention of Austenite in S.A.E. 5140, 2340 and T1340 Steels of Comparable Hardenability. A. R. Troiano. *American Society for Metals, Preprint* No. 3, 1948, 16 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1093-1107; discussion, p. 1107-1112.

Austenite transformation diagrams for steels of equal hardenability, results of determination of the retention of austenite. Results of an X-ray diffraction study of retained austenite in Jominy hardenability test bars of these three steels. Correlates same with microstructural characteristics of the bars.

4b-68. The Microstructure of Low Carbon Steel. R. L. Rickett and F. C. Kristufek. *American Society for Metals, Preprint* No. 4, 1948, 30 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1113-1141; discussion, p. 1141-1144.

Microstructure of low-carbon steel in terms of isothermal transformation of austenite, precipitation of carbide from ferrite; and influence of prior structure, amount of cold reduction, and effect of annealing variables.

4b-69. Influence of Nickel and Molybdenum on Isothermal Transformation of Austenite in Pure Iron-Nickel and Iron-Nickel-Molybdenum Alloys Containing 0.55% Carbon. D. A. Scott, W. M. Armstrong, and F. A. Forward. *American Society for Metals, Preprint* No. 5, 1948, 22 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1145-1164.

Metallographic investigation of transformation for two series of Fe-Ni-C alloys containing 0.55% C and 0, 2, 3.75, and 5% Ni respectively. One series contained no Mo, the other 0.35%. Laboratory procedure for production of these alloys.

4b-70. The Transformation Characteristics of Ten Selected Nickel Steels. J. P. Sheehan, C. A. Julien, and A. R. Troiano. *American Society for Metals. Preprint* No. 6, 1948, 19 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1165-1181; discussion, p. 1182-1184.

Results of a systematic study of the effect of nickel, in quantities of 5% and more, on the austenite transformation of steel having various carbon contents. Experimental precedure included dilatometric and metallographic methods.

4b-71. Distributions of Nonmetallic Inclusions in Some Killed Alloy Steel Ingots. K. L. Fetters, M. M. Helzel, and J. W. Spretnak. *American Society for Metals, Preprint* No. 9, 1948, 19 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 303-321; discussion, p. 322-327.

Results of a study which consisted of metallographic and petrographic examination of the inclusions obtained by acid extractions.

4b-72. Some Factors Affecting Subsurface Defects in Large Forging Steel Ingots. E. A. Loria and H. D. Shepard. *American Society for Metals, Preprint* No. 10, 1948, 31 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 328-358; discussion, p. 358-364.

Results of an investigation of defects which occur at or near the ingot surface in several large steel forging ingots of a particular acid open hearth grade. Specimens were examined critically by means of transverse macroetch tests, sulphur prints, magnaflux, and microscopy in an effort to determine factors affecting their formation.

4b-73. Density Variations in Some Killed Steel Ingots. C. F. Sawyer and J. W. Spretnak. *American Society for Metals, Preprint* No. 11, 1948, 10 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 365-372; discussion, p. 372-374.

Results of a density survey of five killed alloy-steel ingots in an effort to evaluate the significant factors which may contribute to rejection of tubes processed from the bottom third of the ingots.

4b-74. The Nature of Inclusions in Tensile Fractures of Forging Steels. H. D. Shephard and E. A. Loria. *American Society for Metals, Preprint* No. 12, 1948, 19 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 375-393; discussion, p. 393-395.

Procedure for studying the nature of flaws in steel by observing the appearance of tensile fractures under polarized light. Interpretation is based on careful metallographic examination of the specimens at or in the vicinity of the fracture.

4b-75. The Microstructure and Mechanical Properties of Cast Steels. M. F.

Hawkes and B. F. Brown. *American Society for Metals, Preprint* No. 17, 1948, 39 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 519-556; discussion, p. 556-564.

A study of the microstructures of a large number of plain carbon, low-alloy, and medium-alloy cast steels after various annealing and normalizing treatments.

4b-76. Residual Stresses and Microstructure in Hollow Cylinders. H. B. Wishart and R. K. Potter. *American Society for Metals, Preprint* No. 24, 1948, 20 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 692-710; discussion, p. 710-714.

Methods for obtaining compressive and tensile stresses; effect of microstructure on residual stresses.

4b-77. Delta Ferrite Formation and Its Influence on the Formation of Sigma in a Wrought Heat Resisting Steel. John J. Gilman, Pun Kien Koh and Otto Zmeskal. *American Society for Metals, Preprint* No. 28, 1948, 20 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1371-1388; discussion, p. 1388-1399.

A metallographic study. Structural stability at 1200 to 1600° F. was studied for the cases of initial structures high and low in ferrite, 22 to 23% and 2 to 3%, respectively. The presence of ferrite accelerated the formation of the sigma phase; however, cold work had an even more pronounced effect. This phase was identified by X-ray diffraction and the pattern compared with those obtained by other investigators.

4b-78. Cause and Cure of Inverse Chill and Hard Spots in Cast Iron. C. A. Zapffe and R. L. Phebus. *American Society for Metals, Preprint* No. 39, 1948, 28 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 259-284; discussion, p. 285-292.

Presents a study of above abnormal conditions based on the assumption that both conditions follow directly from hydrogen segregation similar to that causing flakes in forgings, white spots in castings, and fisheyes in welds; the study also shows the thermodynamic nature of stabilization in general, and stabilization by hydrogen in particular and suggests methods for prevention of the defects.

4b-79. The Maurer Diagram and its Evolution and a New Structural Diagram for Cast Iron. H. Laplanche. *Foundry Trade Journal,* v. 85, Aug. 26, 1948, p. 191-198, 203; Sept. 2, 1948, p. 225-230; Sept. 9, 1948, p. 249-253; discussion, p. 253-254. Translated from the French.

See abstract of "A New Structural Diagram for Cast Iron," *Metal Progress,* v. 52, Dec. 1947, p. 991-993. See item 4-202, 1947.

4b-80. Stainless Steel Through the Microscope. Theodore A. Pruger. *Steel Horizons,* v. 10, No. 4, [1948], p. 14-15.

Elementary principles of microstructures and tranformations.

4b-81. Nature of the Nondiffusing (Martensite) Transformation. (In Russian.) G. V. Kurdyumov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 60, June 21, 1948, p. 1543-1546.

A theory for an anomaly in the kinetics of the transformation. 11 ref.

4b-82. Kinetics of the Transformation of Austenite Into Martensite at Low Temperatures. (In Russian.) G. V. Kurdyumov and O. P. Maksimova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 1, 1948, p. 83-86.

A new approach in investigations of the above consisting in delaying the martensite transformation by rapid cooling to the temperature of liquid nitrogen (−194° C).

4b-83. Diffusion of Carbon in Austenite With a Discontinuity in Composition. L. S. Darken. *Metals Technology,* v. 15, Sept. 1948, T.P. 2443, 9 pages.

Experimental results show that, in a system of more than two components, diffusion may take place from the zone of low concentration to that of high. Four welded steel pairs were held at 1050° C. for two weeks. When the carbon contents were the same before welding and aging, they differed markedly afterwards; when they were different, "uphill" diffusion occurred. This phenomenon is shown to be induced by a wide difference in either the Si or Mn content of the austenite. Diffusivity of carbon in the several austenites at 1050° C. was determined and results found to be in good agreement with those of Wells and Mehl. 11 ref.

4b-84. Stabilization of the Austenite-Martensite Transformation. William J. Harris, Jr., and Morris Cohen. *Metals Technology,* v. 15, Sept. 1948, T.P. 2446, 24 pages.

The kinetics of the above transformation in four 1.1%-C steels with variations in Cr and Ni contents were studied quantitatively by lineal analysis. The course of the transformation was determined during rapid cooling with and without the influence of stabilization, using three

different austenitizing temperatures. 24 ref.

4b-85. Elimination of the Thermal-Diffusion Error in Studies of Gas-Metal Equilibrium. Minu N. Dastur and John Chipman. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 7 pages.

Possible methods for eliminating the thermal diffusion error in determination of equilibrium in the reaction of hydrogen and water vapor with molten iron containing dissolved oxygen. Apparatus and results.

4b-86. Kinetics of Nitrogen Evolution From an Iron-Nitrogen Interstitial Alloy. Charles Goodeve and K. H. Jack. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 10 pages.

Experimental procedure and results of a study of the structures of iron nitrides. The mechanism of the surface reaction for denitriding in vacuo. A kinetic equation for the rate of nitrogen evolution.

4b-87. As-Cast Structures in Cast Steels. M. F. Hawkes and B. F. Brown. *Iron Age,* v. 162, Oct. 14, 1948, p. 138-147.

An explanation of the dendritic segregation which occurs in the course of solidification of alloy as well as plain-carbon cast steels. Supplemented with a metallographic study giving examples of almost every type of cast-steel structure in which the influence of dendritic segregation is prominent.

4b-88. The Nature of the Bonds in the Iron Silicide FeSi and Related Crystals. (In English.) L. Pauling and A. M. Soldate. *Acta Crystallographica,* v. 1, Sept. 1948, p. 212-216.

FeSi was reinvestigated by X-ray photography of single crystals, and the reported structure for the substance verified. The structure and the interatomic distances. It is shown that the interatomic distances are compatible with those found for elementary Fe and Si.

4b-89. Atomic Displacements in the Austenite-Martensite Transformation. (In English.) M. A. Jaswon and J. A. Wheeler. *Acta Crystallographica,* v. 1, Sept. 1948, p. 216-224.

It is shown that the tetragonality of martensite is necessary if it is assumed that the iron and carbon-atom displacements constitute a common homogeneous deformation. An explanation of the observed high indices of the habit plane of martensite of certain carbon contents is advanced.

4b-90. Constitution et propriétés de quelques alliages fer-carbone-glucinium a plus de 3% de carbone. (Constitution and Properties of Several Iron-Carbon-Beryllium Alloys Containing More Than 3% Carbon.) Marcel Ballay. *Revue de Métallurgie,* v. 45, July 1948, p. 231-238.

Particular emphasis on crystal structure and mechanical properties. Optimum conditions for heat treatment of 13 alloys with beryllium contents between 0 and 3.88%.

4b-91. Classification of Solubility of Elements in Iron. III. Intermediate Solid Solutions of Iron. (In Russian.) I. I. Kornilov. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk.* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), July-Aug. 1948, p. 369-376.

Isolates a group of elements with atomic diameters differing from that of iron by 8 to 15% which form binary intermediate solid solutions with iron. A method of systemization of ternary, quaternary, and more complicated intermediate solid solutions of ferrite is proposed on the basis of such elements and the number of possible systems is computed. Hypothetical two and three-dimensional diagrams.

4b-92. Het T.T.T. Diagram. (The T.T.T. Diagram). F. van Wijk. *Metalen,* v. 2, Aug. 1948, p. 253-258.

Principles of the isothermal austenite transformation. Some illustrative transformation-temperature-time diagrams are given. The effects of the common alloying elements in steel on the above transformation are briefly mentioned.

4b-93. Further Investigation on the Graphitization of Piping for the EEI and AEIC. A. M. Hall and S. L. Hoyt. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 847-853; discussion, p. 853.

C-Mo, Cr-Mo, and V-Mo compositions were tested at 1125° F. An effort was made to relate plastic deformation with graphitization on a laboratory basis. The high resistance of Cr-Mo steels was confirmed and further information was obtained on the existence of an incubation period in the graphitization process.

4b-94. The Effect of Hydrogen on the Ductility of Cast Steels. Clarence E. Sims, George A. Moore, and Donald W. Williams. *Metals Technology,* v. 15, Oct. 1948, T.P. 2454, 26 pages.

Deals with "temporary abnormal low ductility", a type for which low-temperature aging is sufficient remedy, although no visible change in

microstructure takes place. The effect of hydrogen, effect of nitrogen and of deoxidation practice, change of properties with aging, and nature of aging. 16 ref.

4b-95. Kinetics of Grain Growth of Austenite in Medium Carbon Steels with Small Boron Contents. (In Russian.) S. M. Vinarov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences, June 1948, p. 899-906.

Attempts to solve the controversy existing in the technical literature. Results of investigation showed that variation of the amount of boron added (0.001 to 0.010%) caused variation of the grain size of the final product.

4b-96. Theories of Austenitic Grain-Size Control of Steel. B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 7, Oct. 1948, p. 447-451.

A review. 25 ref.

4b-97. A Study of Residual Gases in Cast Iron. J. E. Hurst and R. V. Riley. *Foundry Trade Journal,* v. 85, Oct. 28, 1948, p. 407-414; Nov. 4, 1948, p. 429-432; discussion, p. 432-434.

Methods for determination; effects of storage on gas content; segregation of gases in cast iron; effects of remelting; effects of gas on microstructure and on physical and mechanical properties; and significance of gas content in production of sound castings.

4b-98. Is Nodular Cast Iron New? *Iron and Steel,* v. 21, Nov. 1948, p. 470-471.

Letter from George Moseley quotes from book by J. E. Johnson, "The Principles, Operation and Products of the Blast Furnace", published in 1918, to show that cast irons having nodular structures, as recently described by H. Morrogh, are not something new. Morrogh's reply attempts to show that Johnson did not obtain nodular graphite structures, but only flake and undercooled graphite structures.

4b-99. Effects of Inclusions on the Endurance Properties of Steels. William C. Stewart and W. Lee Williams. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 475-504.

Tests on materials rejected because of the presence of so-called "excessive" inclusions. The inclusions were classified into a few general types. Certain types and arrangements of longitudinal inclusions cause reduction of mechanical properties but small globular inclusions do not cause significant decrease in fatigue properties. The theory involved.

4b-100. The Microstructure of Low Carbon Steel. R. L. Rickett and F. G. Kristufek. *Steel Processing,* v. 34, Nov. 1948, p. 605-607. A condensation.

Previously abstracted from *American Society for Metals, Preprint* no. 4, 1948. See item 4b-68, 1948.

4b-101. La fonte grise. Mécanisme de la solidification des fontes grises hypoeutectiques. (Gray Cast Iron. The Mechanism of Solidification of Hypoeutectic Gray Cast Irons.) Henri Laplanche. *Fonderie,* v. 32, Aug. 1948, p. 1253-1270.

Results of experimental study. Method and apparatus. The influence of various factors such as graphite and silicon content and simultaneous or separate addition of manganese or phosphorus. 13 ref.

4b-102. Sulfides in Carbon Steel. (In Russian.) Yu. T. Lukashevich-Dubanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1038-1043.

Results of investigation showed the different shapes of such inclusions, for sulphides of different composition, and for pure sulphur.

4b-103. Austenite Breakdown; Inter-Relation of Hardenability and Isothermal Transformation Data. W. I. Pumphrey and F. W. Jones. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 561-564.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 137-144. See item 3b-101, 1948.

4b-104. Retained Austenite. Morris Cohen. *Metal Progress,* v. 54, Dec. 1948, p. 823-826. Condensed from 23rd Campbell Memorial Lecture.

Emphasizes the main facts about retained austenite, but omits the discussion of theory. The complete document will appear in v. 41, *Transactions of the American Society for Metals,* 1949.

4b-105. Transformation of S.A.E. 4330 Steel During Continuous Cooling. C. A. Liedholm and others. *Metal Progress,* v. 54, Dec. 1948, p. 848-B.

A partial continuous-cooling transformation diagram including 11 photomicrographs.

4b-106. Uber die Berechnung der eutektischen Kristallisationsgeschwindigkeit, dargestellt am Beispiel des Perlits. (Calculation of the Rate of Eutectic Crystallization, Shown by the Example of Pearlite.) Erich Scheil. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 123-130.

Details of calculation method

based on an ideal stationary process. The saturation curve of supercooled austenite for ferrite and cementite was required for the rate calculation. It was calculated on the assumption that the heat of mixing could be neglected and that some of the gaps in the austenite lattice remain unoccupied, but not those in the center of the octahedron.

4b-107. Einfluss von Sulfid auf Umsetzungen der Eisennitride. (The Effect of Sulphide on the Transformation of Iron Nitrides.) H. W. Kohlschuetter and M. Pavel. *Zeitschrift fuer anorganische Chemie,* v. 255, Dec. 1947, p. 65-72.

Proves experimentally that, between 400 and 600° C., small amounts of FeS have a powerful inhibiting effect on the separation of nitrogen from iron sulphides as well as on the solid-state reaction: $Fe_2N + 2Fe \rightarrow Fe_4N$.

4b-108. Uber Herstellung und Umsetzung der Eisennitride. (Production and Transformation of Iron Nitrides.) H. W. Kohlschuetter and K. Lohnes. *Zeitschrift fuer anorganische Chemie,* v. 255, Dec. 1947, p. 73-78.

Production of iron nitrides by reaction of iron with ammonia. Compositions and structures were chemically and radiographically analyzed. 10 ref.

4b-109. The Boron-Oxygen Equilibrium in Liquid Iron. Gerhard Derge. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 93-107; discussion, p. 107-110.

Previously abstracted from *Metals Technology,* Aug. 1946, T.P. 2004. 17 ref. See item 2-120, 1946.

4b-110. Grain-Growth Inhibitors in Steel. James W. Halley. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 224-234; discussion, p. 235-236.

Previously abstracted from *Metals Technology,* June 1946, T.P. 2030. See item 4-50, 1946.

4b-111. Constitution of Commercial Low-Carbon Iron-Silicon Alloys. R. L. Rickett and N. C. Fick. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 346-354; discussion, p. 354-356.

Previously abstracted from *Metals Technology,* Feb. 1946, T.P. 1966. See item 4-28, 1946.

4b-112. Effect of Original Orientation on Orientation Changes During Recrystallization in Silicon Ferrite. C. G. Dunn. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 357-371; discussion, p. 371-372.

Previously abstracted from *Metals Technology,* Aug. 1946, T.P. 1990. See item 4-73, 1946.

4b-113. Some Aspects of Crystal Recovery in Silicon Ferrite Following Plastic Strains. C. G. Dunn. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 373-394.

Previously abstracted from *Metals Technology,* Aug. 1946, T.P. 1991. 12 ref. See item 4-74, 1946.

4b-114. The Solubility of Hydrogen in Molten Iron-Silicon Alloys. Hung Liang, Michael B. Bever, and Carl F. Floe. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 395-403; discussion, p. 403-404.

Previously abstracted from *Metals Technology,* Feb. 1946, T.P. 1975. 17 ref. See item 4-29, 1946.

4b-115. Some Factors Affecting Edgewise Growth of Pearlite. W. H. Brandt. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 405-417; discussion, p. 417-418.

After discussing the theory of edgewise growth of pearlite, effects of carbon content and alloying elements are considered.

4b-116. Anisothermal Decomposition of Austenite. J. H. Hollomon, L. D. Jaffe and M. R. Norton. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 419-439; discussion, p. 439-441.

Previously abstracted from *Metals Technology,* Aug. 1946, T.P. 2008. 34 ref. See item 4-75, 1946.

4b-117. Phase Boundaries in Medium-Alloy Steels. W. A. West. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 535-546; discussion, p. 546-549.

Previously abstracted from *Metals Technology,* Jan. 1946, T.P. 1924. 27 ref. See item 4-24, 1946.

4b-118. Equilibrium Relations in Medium-Alloy Steels. Clarence Zener. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167. Iron and Steel Division, 1946, p. 513-534; discussion, p. 546-549.

Previously abstracted from *Met-*

als Technology, Jan. 1946, T.P. 1856. 20 ref. See item 4-23, 1946.

4b-119. Kinetics of the Decomposition of Austenite. Clarence Zener. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 550-583; discussion, 583-595.

Previously abstracted from *Metals Technology,* Jan. 1946, T.P. 1925. 39 ref. See item 4-25, 1946.

4b-120. Graphite Formation in Grey Cast Iron. H. Morrogh and W. J. Williams. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A47-A61, discussion, p. A62-A63. Also appeared as advance copy No. 875.

Previously abstracted from *Engineering,* v. 164, Aug. 8, 1947, p. 141-143; Aug. 15, 1947, p. 166-168. See item 4-127, 1947.

4b-121. An Interpretation of the Constitution of Iron-Carbon-Silicon Alloys. J. E. Rehder. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 77-79; discussion, p. 79-81.

Previously abstracted from preprint. See item 4b-10, 1948.

4b-122. Graphite Phase in Gray Cast Iron. Robert W. Lindsay. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 134-143; discussion, p. 143-145.

Previously abstracted from preprint. See item 4b-12, 1948.

4b-123. Occurrence of Intergranular Fracture in Cast Steels. C. H. Lorig and A. R. Elsea. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 160-173; discussion, p. 173-174.

Previously abstracted from pre--print. See item 3b-36, 1948.

4b-124. Isothermal Transformation of Molybdenum Cast Iron. Charles Nagler and Ralph L. Dowdell. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 260-275; discussion, p. 275-276.

Previously abstracted from preprint. See item 4b-11, 1948.

4b-125. Segregation in Small Steel Castings. H. F. Bishop and K. E. Fritz. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 412-426; discussion, p. 426-429.

Previously abstracted from preprint. See item 4b-14, 1948.

4b-126. Microstructure of Silvery Pig Iron. Richard Schneidewind and Carl Harmon. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 602-605; discussion, p. 605-606.

Previously abstracted from preprint. See item 4b-13, 1948.

4b-127. Transformation of Austenite in an Aluminum-Chromium-Molybdenum Steel. R. A. Grange, W. S. Holt, and E. T. Tkac. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 452-464; discussion, p. 464-466.

Previously abstracted from *Metals Technology,* v. 13, Dec. 1946, TP 2109. See item 4-135, 1946.

4b-128. The Effect of Cobalt on the Rate of Nucleation and the Rate of Growth of Pearlite. M. F. Hawkes and R. F. Mehl. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 467-492.

Previously abstracted from *Metals Technology,* v. 14, Aug. 1947, TP 2211. See item 4-147, 1947.

4b-129. Hot Deformation Structures, Veining and Red-Shortness Cracks in Iron and Steel. A. Hultgren and B. Herrlander. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 493-509.

Previously abstracted from *Metals Technology,* v. 13, Dec. 1946, TP 2106. See item 4-134, 1946.

4b-130. Austenite Grain Size in Cast Steels. M. F. Hawkes. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 510-530; discussion, p. 530.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2170. See item 4-75, 1947.

4b-131. The Diffusion Rates for Carbon in Austenite. F. E. Harris. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 531-552; discussion, p. 552-555.

Previously abstracted from *Metals Technology,* v. 14, Aug. 1947, TP 2216. See item 4-148, 1947.

4b-132. Retained Austenite. Morris Cohen. *Transactions of the American Society for Metals,* v. 41, 1949, p. 35-94.

Twenty-third Edward DeMille Campbell Memorial Lecture consists of an extended theoretical and practical discussion of the factors which lead to retained austenite, which govern its amount, and which control its behavior. Effects of temperature are naturally emphasized. 63 ref.

4b-133. Isothermal Transformation of Austenite in Two Alloy Steels. Edward A. Loria. *Transactions of the American Society for Metals,* v. 41, 1949, p. 1248-1260.

Two steels containing appreciable amounts of multiple alloying elements were subjected to isothermal

transformation studies in order to show how the pearlite and bainite reactions are altered by alloy composition and austenite heterogeneity. TTT-diagrams for a Cr-Mo-Mn hypoeutectoid steel and a Ni-Cr-Mo hypereutectoid steel are presented and evaluated.

4b-134. The Effect of Silicon on the Activity of Sulphur in Liquid Iron. J. P. Morris and A. J. Williams, Jr. *Transactions of the American Society for Metals,* v. 41, 1949, p. 1425-1439.

Results of a study of equilibrium conditions at 2940° F. in the reaction between hydrogen gas and sulphur dissolved in liquid iron and Fe-Si alloys. For sulphur concentrations of 1% or less, the equilibrium constant is only about ½ the generally accepted value. Silicon had a pronounced effect on equilibrium conditions.

4c—Nonferrous

4c-1. Hardening of Metals by Internal Oxidation. Part II. J. L. Meijering and M. J. Druyvesteyn. *Philips Research Reports,* v. 2, Aug. 1947, p. 260-280.

Certain alloys of Ag, Cu, and Ni with a few atomic % of a homogeneously dissolved metal having a sufficient affinity for oxygen can be dispersion hardened by diffusing O_2 into them. Diffusion coefficients of oxygen in internally oxidized Ag and Cu alloys are given. X-ray and electrical resistivity measurements indicate that the MgO and Al_2O_3 particles that harden silver are very small. Mechanical properties are not much affected by long annealings at high temperatures. Creep and recrystallization are slowed down considerably. 20 ref.

4c-2. Superlattice Formation. E. A. Owen and G. MacArthur Sim. *Philosophical Magazine,* 7th Series, v. 38, May 1947, p. 342-354.

Occurrence in $AuCu_3$. Measurement of the intensity of the superlattice lines in relation to the intensity of the main-lattice lines leads to investigation of the variation of nucleus with period of annealing at a given temperature. Some new facts concerning the growth of the nuclei.

4c-3. The Thermal Expansion of the Gold-Copper Alloy $AuCu_3$. E. A. Owen and Y. H. Liu. *Philosophical Magazine,* 7th Series, v. 38, May 1947, p. 354-360.

Changes that occur in the dimensions of the $AuCu_3$ lattice on heating.

4c-4. Sur l'Activité Chimique de l'Hydrogene Désorbé par le Palladium et ses Alliages. (The Chemical Activity of Hydrogen Adsorbed by Palladium and Its Alloys.) Jacques Bénard and Philippe Albert. *Bulletin de la Société Chimique de France,* Sept.-Oct. 1947, p. 904-909.

Polished pure palladium and palladium-gold foils were used. Some ionic hydrogen dissolved in the metal, some atomic hydrogen was adsorbed on the surface, and both atomic and molecular hydrogen were released. 12 ref.

4c-5. A Thermal Investigation of the Ternary System Mg-Na-Pb. Part II. The Compound MgNaPb and Several Cross Sections. George Calingaert, Hymin Shapiro and Ivar T. Krohn. *Journal of the American Chemical Society,* v. 70, Jan. 1948, p. 270-277.

Approximately 120 individual alloy compositions within the above system Mg-Na-Pb were investigated by thermal analysis. The system was shown to be complex. A second compound, MgNaPb, was discovered, but unlike the first compound, Mg_4-Na_4Pb_3 (which is of the open maximum type), it is of the peritectic type. Several important cross sections of the system were partly elucidated. Thirty alloys were photographed, including the compound MgNaPb.

4c-6. The Constitution and Properties of Copper-Rich Copper-Chromium and Copper-Nickel-Chromium Alloys. Walter R. Hibbard, Jr., Fred D. Rosi, Howard T. Clark, Jr., and Robert I. O'Herron. *Metals Technology,* v. 15, Feb. 1948, T. P. 2317, 12 pages.

The binary CuCr alloys which were solution treated and aged or solution treated, cold rolled and aged had approximately the same or greater hardness values than the ternary Cu-Ni-Cr alloys. Similarly the addition of Cr to Cu had a greater effect in raising the softening temperature than the addition of Cr to Cu-Ni alloys containing 10, 20, or 30% Ni.

4c-7. Grain Growth in 70-30 Brass. Paul A. Beck, John Towers, and William D. Manly. *Metals Technology,* v. 15, Feb. 1948, T. P. 2326, 7 pages.

Shows that isothermal grain growth in 70-30 brass, as in pure aluminum, can be described by an empirical formula. The heat of activation associated with the growth was found to be 61,800 cal. per g. atom. 10 ref.

4c-8. The Nature of Strain Markings in Alpha Brass. J. E. Burke and C. S. Barrett. *Metals Technology,* v. 15, Feb. 1948, T. P. 2327, 12 pages.

Fine lines which appear on polishing and etching deformed specimens of alpha brass and other alloys were investigated by means of

metallographic and X-ray studies. No evidence for twinning was found and it was concluded that strain markings are traces of slip bands which can be etched because of distortion in the region of the latter. 17 ref.

4c-9. The Copper-Rich Corner of the Copper-Aluminum-Silicon Diagram. Franklin H. Wilson. *Metals Technology,* v. 15, Feb. 1948, T. P. 2329, 12 pages.

Results, of sufficient precision to serve as a guide for the control of the manufacture of alloys in the region covered, are presented in a series of both isothermal and vertical sections of the diagram. The most conspicuous feature is the existence of the kappa phase of the Cu-Si system at as high as 8.5% Al.

4c-10. Activity Coefficients in Alpha Brass from Statistical Thermodynamics. Lester Guttman. *Metals Technology,* v. 15, Feb. 1948, T. P. 2330, 5 pages.

The free-energy formulas derived by Takegi on the basis of quasi-chemical theory are extended to give expressions for activity coefficients of the components of disordered binary solid solutions. The results may be applied with fair accuracy to the system α-CuZn. The degree of short-range order and approximate temperature of disappearance of long-range order are computed for the α-phase.

4c-11. Unpredicted Cross-Slip in Single Crystals of Alpha Brass. Robert Maddin, C. H. Mathewson, and W. R. Hibbard. *Metals Technology,* v. 15, Feb. 1948, T. P. 2331, 14 pages.

Part of an extensive investigation on the development and characteristics of glide ellipses in single, crystalline, alpha-brass rods. Especially concerned with observation of cross-slip in crystals oriented wholly within the range of slip on a single system according to the generalizations first presented by Taylor and Elam in 1923. The mechanism of plastic slip in the above material. 20 ref.

4c-12. Wire Textures of Copper and Its Binary Alpha Solid Solution Alloys With Aluminum, Nickel and Zinc. Walter R. Hibbard. *Metals Technology,* v. 15, Feb. 1948, T. P. 2334, 10 pages.

Theories of deformation textures are discussed with particular reference to the direction of flow and the presence of slip systems suitably oriented for stability and producing the necessary changes in shape required by the deformation mechanism. Effects of additions of different percentages of Al, Ni, and Zn on the above textures, 35 ref.

4c-13. Deformation Lines in Cold Rolled Copper and Its Binary Alpha Solid Solution Alloys With Aluminum, Nickel and Zinc. W. R. Hibbard, Harold Margolin, and H. P. Moore, *Metals Technology,* v. 15, Feb. 1948, T. P. 2336, 10 pages.

Lines were developed at lower percentage reductions during cold rolling of binary Cu alloys containing Al, Ni, or Zn in solid solution than during rolling of Copper. Alloys in the middle of the solid-solution ranges developed lines at lower percentage reductions than others. No relationship was apparent between strain hardening or eventual rolling texture and initial formation of deformation lines. A possible correlation between the appearance of the lines and the type of rolling texture eventually formed is suggested. 17 ref.

4c-14. Mechanism of Precipitation in Alloys of Beryllium in Copper. A. G. Guy, C. S. Barrett, and R. F. Mehl. *Metals Technology,* v. 15, Feb. 1948, T. P. 2341, 23 pages.

Several different techniques were used in the study of the above, including quenching from solution temperature directly to aging temperature; measurement of change of electrical resistance during aging; Tukon hardness testing of grain-center and grain-boundary areas of tricrystals; and Laue and Debye X-ray diffraction, the latter with an improved system. Evidence for acceleration of hardening by strains produced by water quenching, and for the theory that strain is the cause of grain-boundary precipitation, was obtained. It was concluded that the observed behavior can be explained by the same theory used to account for hardening of Al-Cu and Al-Ag alloys. 20 ref.

4c-15. Sur l'Existence d'Une Nouvelle Modification Non-Cubique de Silicium Elementaire. (The Existence of a New Noncubic Modification of Elementary Silicon.) F. Heyd, F. Khol, and A. Kochanovsta. *Collection of Czechoslovak Chemical Communications,* v. 12, Sept.-Oct. 1947, p. 502-509.

By means of X-ray diffraction, a noncubic modification was discovered. It is unstable and may easily be transformed into the usual diamond shape by piezochemical means.

4c-16. Instantaneous Rates of Grain Growth. Paul A. Beck, M. L. Holzworth, and Hsun Hu. *Physical Review,* 2nd Series, v. 73, March 1, 1948, p. 526-527.

Previous work showed that the isothermal increase of the average grain size (D) with annealing time (t) in high purity aluminum follows the relation: $D=Kt^n$ where K and n are parameters depending on the temperature. More recent experiments show that the rate of grain growth in high-purity aluminum after 33% reduction of area by rolling depends only on instantaneous grain size and temperature, and is independent of the prior heat treatment used to produce the instantaneous grain size considered. Typical results and also data for 70-30 brass.

4c-17. Fractographic Structures in Antimony. C. A. Zapffe. *Metal Progress,* v. 53, March 1948, p. 377-381.

Third of a series of studies of fresh cleavage planes in brittle metals, where the untouched facets are examined under the high-power microscope for evidence concerning the mechanism of fracture.

4c-18. The Technology of Copper-Lead Alloys. R. W. K. Honeycombe. *Section of Tribophysics, Council for Scientific & Industrial Research, Commonwealth of Australia, Physical Metallurgy Report* No. 6, Serial No. A.158. Oct. 20, 1947, 18 pages.

A discussion of those alloys of Cu containing between 10 and 40% Pb with or without small percentages of other elements such as Sn, Ag, Ni, and P. The majority of the Cu-Pb alloys used in heavy-duty bearings fall into this category; however, such alloys find many other applications. The effects of minor alloying elements; effects of temperature on structure; use of deoxidants; casting of Cu-Pb alloys; frictional and wear properties; and applications.

4c-19. The Ratio of Valence Electrons to Atoms in Metals and Intermetallic Compounds. Linus Pauling and Fred J. Ewing. *Reviews of Modern Physics,* v. 20, Jan. 1948, p. 112-122.

Numbers of valence electrons assigned to γ—alloys, β—manganese and alloys with similar structure, and α—manganese by a new system of metallic valences agree closely with electron numbers calculated for complete filling of important Brillouin polyhedra for these structures.

4c-20. Viscous Slip Along Grain Boundaries and Diffusion of Zinc in Alpha Brass. T'ing-Sui Ke. *Journal of Applied Physics,* v. 19, March 1948, p. 285-290.

The viscous behavior of the grain boundaries in 70-30 alpha brass has been demonstrated by anelastic measurements. The grain boundaries cannot sustain permanently a shear stress and have a coefficient of viscosity decreasing with an increase of temperature. Using the same specimen, activation energy associated with stress-induced preferential orientation of pairs of Zn atoms in alpha brass was determined and found to be identical, within experimental error, to activation energy associated with grain-boundary slip in alpha brass. This indicates that grain boundary slip is a diffusion process and that the diffusion mechanism is similar to volume diffusion. 14 ref.

4c-21. An Electron Compound in Alloys of the Transition Metals. A. H. Sully and T. J. Heal. *Research,* v. 1, March 1948, p. 288.

During preliminary investigation of the constitution of Cr-Co alloys, it was noted that some alloys in the range 25 to 50% Cr, under certain conditions of heat treatment, contain a phase isomorphous with the sigma phase which occurs in the Fe-Cr system. Wever and Haschimoto have previously assigned a range of homogeneity from 40 to 45% Co at room temperature to a delta phase, the diffraction pattern of which also appears to be isomorphous with the sigma phase. The isomorphism of these phases is said to be of importaince for the development of alloys for use at high temperatures.

4c-22. The Catalytic Reaction of Hydrogen and Oxygen on Plane Faces of a Single Crystal of Copper. Henry Leidheiser, Jr., and Allan T. Gwathmey. *Journal of the American Chemical Society,* v. 70, March 1948, p. 1200-1206.

Single crystals in the form of spheres exposing all possible faces and in the form of slices parallel to a particular face were studied. The crystals were mechanically and electrolytically polished and annealed in hydrogen. With oxygen concentrations of 1 to 20% at 400° C., regular rearrangements were found to take place in the surface of the metal, exposing certain facets on some faces, roughening others without the development of particular planes, while other faces remained quite smooth and were apparently undisturbed.

4c-23. The Selective Deposition of Carbon on the (111) Face of a Nickel Crystal in the Catalytic Decomposition of Carbon Monoxide. Henry Leidheiser, Jr., and Allan T. Gwathmey.

Journal of the American Chemical Society, v. 70, March 1948, p. 1206.

Results reported are an example of a catalytic process which does not lead to visible rearrangement of the surface initially and which proceeds at a rate dependent on crystal face.

4c-24. Solidification Mechanism of Tin Bronzes. Clyde L. Frear. *Foundry,* v. 76, April 1948, p. 68-71, 124, 126.

Most of the discussion deals with gun metal conforming to Navy department specification 46-M-6, but applies equally well to the 90-10 or the 88-10-2 alloy. Since the type of defect which is the chief cause of leakage in bronze castings is the one known as interdendritic shrinkage, intergranular shrinkage, shrinkage porosity, overall porosity, microshrinkage, or microporosity, the article is limited to this phenomenon, its causes, and methods for combating difficulties caused by its presence. (To be concluded.)

4c-25. Liquidus-Solidus Points of the Manganese-Nickel System. Jack M. Paul and G. V. Beard. *Journal of Physical & Colloid Chemistry,* v. 52, April 1948, p. 750-753.

The liquidus-solidus points of the above alloys from 35% Mn-65% Ni to 80% Mn-20% Ni were determined.

4c-26. A Note on the Forms of the β-Phase Regions in Certain Ternary Alloys of Copper. G. V. Raynor. *Philosophical Magazine,* 7th Series, v. 39, March 1948, p. 212-218.

In many binary alloys with Cu, Ag, Au as solvent, electron compounds with body-centered cubic, close-packed hexagonal, or β manganese crystal structures are formed at an electron-atom ratio of 3 to 2. Increasing solute valency favors formation of the latter structures, whereas increasing temperature favors the body-centered cubic phases. The latter is also favored by increasing the size-factor of the solute with respect to the solvent. For the systems Cu-Zn, Cu-Al, and Cu-Sn, which are of interest in interpreting the structures of several important copper-rich ternary alloys, the size-factor is positive and increases in the order given. The phase based on CuZn is stable at room temperature. The phases based on Cu_3Al and Cu_5Sn, however, decompose eutectoidally at 570 and 586° C., respectively. Stabilization by increasing size-factor thus appears to outweigh the effect of increasing valency.

4c-27. Equilibrium Relationships in Ternary Alloys. G. V. Raynor. *Philosophical Magazine,* 7th Series, v. 39, March 1948, p. 218-229.

The effect of compound formation on the solid-solubility isothermals of certain Cu and Ag-rich ternary systems, where the extent of the solubility would be governed, in the absence of compound formation, by valency considerations. Conditions under which binary compounds may be expected to enter into equilibrium with the solid solution based on the third element of the ternary system. 12 ref.

4c-28. The Transformation of Cobalt. A. R. Troiano and J. L. Tokich. *Metals Technology,* v. 15, April 1948, T.P. 2348, 12 pages.

Results of an X-ray diffraction study of the cubic-hexagonal transitions of Co, correlating them with data of previous investigators, which have shown considerable disagreement. The transition on cooling is of particular interest. 21 ref.

4c-29. The Effect of Manganese, Iron and Nickel on the α/β Brass Equilibrium. William Hume-Rothery. *Philosophical Magazine,* 7th Series, v. 39, Feb. 1948, p. 89-97.

The forms of the $\alpha/(\alpha+\beta)$ and $(\alpha+\beta)/\beta$ isothermal phase boundaries are discussed for the ternary system Cu-Al-Zn, and for ternary systems of the type Cu-Al-X, and Cu-Zn-X, where X is a transition element. 13 ref.

4c-30. Copper-Lead Alloys. R. W. K. Honeycombe. *American Foundryman,* v. 13, April 1948, p. 113-119.

See abstract of "The Technology of Copper-Lead Alloys", *Section of Tribophysics, Council for Scientific and Industrial Research, Commonwealth of Australia, Physical Metallurgy Report No. 6, Serial No. A158,* Oct. 20, 1947. Item 4c-18. (Presented at 52nd annual meeting, A.F.A., Philadelphia, May 3-7, 1948. Also published as A.F.A. Preprint No. 48-5.)

4c-31. The Disordering of β-Brass by Cold Work. R. W. K. Honeycombe and W. Boas. *Nature,* v. 161, April 17, 1948, p. 612-613.

An investigation. Results of resistivity measurements.

4c-32. Mechanical Behavior of Crystal Boundaries in Metals. R. King, R. W. Cahn, and B. Chalmers. *Nature,* v. 161, May 1, 1948, p. 682.

Results of some preliminary experiments on specimens of tin subjected to tensile loading so arranged as to provide a component of shear

stress acting on the boundary. When such a stress was applied at a temperature a few degrees below the melting point, progressive relative shear displacement of the two crystals took place.

4c-33. Ultrasonic Observation of Twinning in Tin. W. P. Mason, H. J. McSkimm, and W. Shockley. *Physical Review,* Series 2, v. 73, May 15, 1948, p. 1213-1214.

The method of experimentation consists of pressing the metal specimen directly against a quartz crystal with a liquid seal, applying stresses which deform the metal, and observing the resulting motion imparted to the quartz. Results are in general agreement with passage at the speed of sound of twinning dislocations from side to side in the specimen. However, the magnitude of the displacement is about 10 times larger than would be expected from the twinning of one pair of planes.

4c-34. On the Relation Between Deformation and Recrystallization Texture of Nickel-Iron With Cubic Orientation. J. F. H. Custers. *Physica,* v. 13, March 1947, p. 97-116.

Comparison of structures of Ni-Fe and aluminum after cold rolling in a (100) direction and parallel to a (100) plane. Deformation structures were similar, but there was a marked difference in recrystallization structure, which is explained.

4c-35. Sur les Transformations du Cerium a Haute Temperature. (Concerning the Transformation of Cerium at High Temperatures.) Jean Loriers. *Comptes Rendus* (France), v. 226, March 22, 1948, p. 1018-1019.

There are two or three transformations of pure cerium between 600° C. and its melting point. Effect of Fe, Si, Ca, and Al on behavior of Ce at high temperatures.

4c-36. Etude des Transformations Allotropiques du Cérium Pur et d'un Cérium Industriel. (Study of Allotropic Transformations in Pure and Commercial Cerium.) Felix Trombe and Marc Foex. *Revue de Métallurgie,* v. 44, Nov.-Dec. 1947, p. 349-356.

Results of a comparative study. The commercial metal contained 0.22% Fe, 0.08% Al, 0.15% Ca, and traces of Mg and C. The presence of alpha, beta, gamma, and delta phases at 400 to 500° C. Causes of anomalous transformations at low temperatures.

4c-37. Beobachtungen ueber Thalliumdiffusion in Kristallinem hexagonalem Selen. (Observations on the Diffusion of Thallium Into Crystalline Hexagonal Selenium.) B. Gudden and Kurt Lehovec. *Zeitschrift fuer Naturforschung,* v. 1, Sept. 1946, p. 508-511.

Near the melting point of Se, Tl ions diffuse into the former with considerable speed. The diffusion can be observed spectroscopically, but more conveniently by measuring the effect of Tl on the conductivity of Se.

4c-38. The Crystal Structures of Molybdenum and Tungsten Borides. (In English.) Roland Kiessling. *Acta Chemica Scandinavica,* v. 1, no. 10, 1947, p. 893-916.

Similarity between the borides and some carbides is noted. 19 ref.

4c-39. Reactions of Zirconium with Gases at Low Pressure. W. G. Guldner and L. A. Wooten. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 223-235.

The reaction products were studied by means of electron and X-ray diffraction. It was found that ductile zirconium strip can dissolve as much as 38 atom % O_2 without formation of a new phase. A new apparatus for the study of gas-metal reactions at low pressure. 10 ref.

4c-40. Gases nos Bronzes. (Gases in Bronzes.) Clovis Bradaschia. *Boletim da Associacao Brasileira de Metais.* v. 4, April 1948, p. 123-144.

Results of a study of the mechanism of gas absorption and of effect of the gases. Methods for their elimination. 24 ref.

4c-41. Concerning the Character of the Bonds in Phases Formed by Transition Metals With Light Metalloids. (In Russian.) S. A. Nemnonov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 247-252.

Systems containing chromium and H, C, O, and N. On the basis of experimental study of the different types of bonds formed, X-ray data obtained by other investigators are explained. 14 ref.

4c-42. The Cobalt-Chromium Binary System. A. R. Elsea, A. B. Westerman, and G. K. Manning. *Metals Technology,* v. 15, June 1948, T.P. 2393, 24 pages.

The phase diagram was determined as a part of a fundamental study of the factors promoting high-temperature strength of alloys. The first part of the work was concentrated on the Co-rich part of the diagram, and especially the alpha-beta transformation. Later, the study was extended to include the entire diagram. The determination consisted primarily of a metallographic study of specimens heat treated at various temperatures.

X-ray diffraction was used to identify phases in some cases. Methods used and results obtained.

4c-43. Cobalt and Iron. II. The Transformation of Cobalt. *Metal Industry,* v. 72, June 25, 1948, p. 524, 527.

Reviews three recent papers.

4c-44. Influence of Crystal Plane and Surrounding Atmosphere on Some Types of Friction and Wear Between Metals. Allan T. Gwathmey, Henry Leidheiser, Jr., and G. Pedro Smith. *National Advisory Committee for Aeronautics, Technical Note* No. 1461, June 1948, 37 pages.

Influence of crystal plane on dry static friction between two single crystals of copper; influence of surrounding atmospheres of H_2, and N_2 containing 0.2% O_2, on wear between two dry polycrystalline copper surfaces; effect which variation in roughness with plane due to etching has on wear in atmospheres of air and H_2; experiments with recrystallization of a copper single crystal surface upon quenching from a high temperature; and influence of sunlight on atmospheric tarnishing of copper crystals.

4c-45. The Constitution of the Aluminium-Rich Ternary Alloys of Aluminium and Manganese With Zinc and Cadmium. D. W. Wakeman and G. V. Raynor. *Philosophical Magazine,* v. 39, April 1948, p. 245-259.

Constitution of the Al-Mn-Zn alloys was examined in the range 0-6% Mn and 0-40% Zn by the establishment of a 500° C. isothermal. A ternary compound analogous to corresponding compounds in the systems Al-Mn-Ni and Al-Mn-Cu was found to exist. Similar work on Al-Mn-Cd alloys at 600° C. revealed no ternary compound. Thus Ni, Cu and Zn are within the zone of favorable atomic size for the formation of ternary compounds of the type considered, while Cd, with a larger atom, is outside. 11 ref.

4c-46. Die Atomgitterfestigkeit von Kristallen und Metallen als bestimmter Bruchteil des Elastizitätsmoduls. (The Atomic Lattice Strength of Crystals and Metals as a Definite Factor in Modulus of Elasticity). J. Bingel. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 300-304.

The strength of the ideal atomic lattice of cubic face-centered crystals was calculated by Madelung's lattice potential and Barn's electrostatic potential methods as a definite component of the modulus of elasticity. The method is then extended to metals, especially copper.

4c-47. Infruence of Manganese on the Polymorphous Transformation in Iron-Chromium Alloys. (In Russian.) A. T. Grigor'ev and D. L. Kudryavtsev. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences.), no. 2, March-April 1948, p. 165-173.

Two cross sections of the system Fe-Cr-Mn with a constant manganese content of 0.6% and 1.4% respectively and with a variable content of Cr up to 22%. 20 ref.

4c-48. Note on Some Theoretical Discussions of Palladium-Hydrogen and Cognate Systems. Donald P. Smith. *Philosophical Magazine,* v. 39, June 1948, p. 477-481.

Surveys various discussions which seek to account for the hystereses and other characteristics of the above system upon thermodynamical or statistical-mechanical grounds. 27 ref.

4c-49. Das Dreistoffsystem Gold-Kupfer-Nickel II. (The Ternary System of Gold-Copper-Nickel II.) Ernst Raub and Annemarie Engel. *Metallforschung,* v. 2, May 1947, p. 147-158.

X-ray examinations of structure changes of alloys at the corner sections of the Au-Cu-Ni and $AuCu_3$-Ni systems caused by annealing at 300° to 400° C. Effects of cold working before annealing operation on the segregation and transformation reactions in these ternary alloys.

4c-50. Dichte- und Massänderungen kaltverformter Zinklegierungen (Changes in Density and Dimensions of Cold Worked Zinc Alloys.) Karl Lohberg. *Metallforschung,* v. 2, June 1947, p. 169-172.

The change in density caused by cold working is explained as the result of translation and mechanical twinning. The decrease in the length of the bars when stored at 95° C. is related to the variation in density and possibly to the recrystalization of the worked material. 13 ref.

4c-51. Uber, den Gefugeaufblau von Sinterhartmetallen, insbesondere von Wolframkarbid-Titankarbid-Kobalt-Legierungen. (The Structure of Sinter-Hard Metals, Especially Alloys of Tungsten Carbide, Titanium Carbide and Cobalt.) Richard Kieffer. *Metallforschung,* v. 2, July-Aug. 1947, 236-238.

The structures of these alloys containing different amounts of binder contents and the effect of long-time sintering on the structures of WC-Co and WC-TiC-Co alloys with different carbide contents. A new

etching process is given to identify the different carbide phases.

4c-52. The Thermal Etching of Silver. B. Chalmers, R. King and R. Shuttleworth. *Proceedings of the Royal Society,* ser. A, v. 193, July 21, 1948, p. 465-483.

The mechanism whereby grain boundaries are delineated and striations formed on polished surfaces of heated metal specimens was examined. Experiments on electrolytically polished silver show that grooves form at grain boundaries at temperatures as low as 300 and striations at 500° C. in air. A furnace for high-temperature photomicrography, suitable for temperatures up to about 950° C. is described. 40 ref.

4c-53. Zur Metallurgie der Bleibronzen fur Verbundgussgleitlager. (The Metallurgy of Lead Bronzes for Cast-Alloy Bearings.) F. Bollenrath. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 417-422.

The importance of hydrogen and oxygen in lead-bronze bearings, the solubility of hydrogen and phosphorus in Cu-Pb alloys, the effect of the phosphorus on the diffusion of copper in iron, and the importance of phosphorus on the fusibility of lead bronzes in steel shells. 14 ref.

4c-54. The Constitution of Aluminium-Copper-Magnesium-Zinc Alloys at 460° C. D. J. Strawbridge. W. Hume-Rothery, and A. T. Little. *Journal of the Institute of Metals,* v. 74, Dec. 1947, p. 191-225.

The equilibrium diagram of the above system was determined by microscopic examination of alloys annealed for long periods. The range of composition investigated lies within the limits: zinc 0 to 8, copper 0 to 55, and magnesium 0 to 30%. 11 ref.

4c-55. Sur une transformation du sélénium a basse température. (Concerning a Low-Temperature Transformation of Selenium.) Jean-Michel Dunoyer. *Comptes Rendus,* v. 226, May 10, 1948, p. 1524-1525.

The well-known red'gray transformation of selenium was studied. No physical or chemical method for transforming gray or vitreous selenium into the red form (amorphous) is known. Experiments reported show that a stable state of Se exists only below −80° C.

4c-56. Echange entre une lame de cuivre marqué par du radiocuivre at une solution d'ions cuivriques. (Exchange Between Copper Foil Tagged With Radioactive Copper and a Solution of Copper Ions.) Pierre Sue, Marguerite Quintin, and Marie Bizouard. *Comptes Rendus,* v. 226, May 24, 1948, p. 1723-1725.

The number of atomic layers or depth of the metal surface participating in the exchange varied from 500 to 17,000 depending on the method of preliminary surface preparation. The results should be of great value in metallography.

4c-57. Kristallchemie des In und Ga in Legierungen mit einigen Ubergangselementen (Ni, Pd, Pt, Cu, Ag und Au). (Crystal Chemistry of In and Ga in Alloys Containing Several Transition Elements—Ni, Pd, Pt, Cu, Ag, and Au.) Erwin Hellner and Fritz Laves. *Zeitschrift fur Naturforschung,* v. 2a, March 1947, p. 177-183.

The hitherto unknown crystal structures of the intermetallic phases of gallium and indium alloyed with the above elements. Constitution diagrams of several of the alloys. 14 ref.

4c-58. Platinum-Tungsten Alloys. Robert I. Jaffee and Herluf P. Nielsen. *Metals Technology,* v. 15, Aug. 1948, T.P. 2420, 13 pages.

Results of a study of solidus temperatures, microstructures, hardnesses, and high-temperature oxidation resistances of above alloys containing 25 to 100% W. The alloys containing high tungsten contents were hard, brittle, and unworkable.

4c-59. Fractographic Study of Cast Molybdenum. C. A. Zapffe, F. K. Landgraf, and C. O. Worden. *Metals Technology,* v. 15, Aug. 1948, T.P. 2421, 21 pages.

Results of a special study undertaken to investigate those patterns ascribed to forgeability and nonforgeability. An elaborately developed system of cleavage patterns was found. In general, the present observations confirm those of Parke and Ham, and of Woodside; but they also greatly expand the earlier information. 12 ref.

4c-60. Mechanism of Precipitation in a Permanent Magnet Alloy. A. H. Geisler and J. B. Newkirk. *Metals Technology,* v. 15, Aug. 1948, T.P. 2444, 20 pages.

Advantages of use of certain permanent magnet alloys for study of the kinetics of the precipitation reaction and the correlation of structure with properties; then gives results obtained with "Cunico" (50% Cu, 21% Ni, 29% Co). 11 ref.

4c-61. Anomalous Magneto-Resistance Effects in Bismuth. G. K. T. Conn and B. Donovan. *Nature,* v. 162, Aug. 28, 1948, p. 336.

Results obtained during investigation of the behavior of thin fibers of bismuth, which indicate that in certain circumstances its electrical resistance may undergo a small decrease at low field-strengths. Comparison of results with those obtained for single crystals leads to the conclusion that, in general, the fibers are single crystals with their main cleavage planes parallel to the axis.

4c-62. Transgranular Cleavage Facets in Cast Molybdenum. C. A. Zapffe, F. K. Landgraf, and C. O. Worden. *Metal Progress,* v. 54, Sept. 1948, p. 328-331.

Illustrated by "fractographs" judged "best in class" at A.S.M.'s 1947 metallographic exhibit. Forgeability or nonforgeability of a casting can be predicted from fractographic observation of the cleavage facets on a chip broken from the ingot.

4c-63. "Metallization" of Liquid Selenium. (In Russian). S. S. Vrazovskii and B. D. Luft. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, April 1948, p. 409-416.

Transformation into the metallic state of "glassy" selenium in various N-containing organic bases. An abnormality of temperature curves coinciding with an abnormality of electrical conductivity was noted and a hypothesis based on the possible formation of selenide is proposed. 13 ref.

4c-64. Experimental Investigation of the Electron Density in Crystals. II. Electron Density of Copper. (In Russian.) N. V. Ageev and D. L. Ageeva. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), May-June 1948, p. 273-277.

Results of experimental determination of the S-curve of copper by the photographic method from flat test specimens obtained by vacuum deposition. Electronic constants are determined using the triple Fourier series.

4c-65. Sur la recristallisation isotherme du cuivre et de l'aluminium. (Isothermal Recrystallization of Copper and Aluminum.) Pierre Laurent and Michel Batisse. *Comptes Rendus,* v. 226, June 21, 1948, p. 2074-2075.

The temperature-time curve of recrystallization of Cu follows a logarithmic pattern, while that of Al does not. A hypothesis is proposed to explain this fact.

4c-66. Sur les équilibres du systeme plomb-cuivre-zinc au voisinage du plomb. (Equilibria in the Lead-Rich Portion of the System Pb-Cu-Zn.) Léon Jollivet. *Comptes Rendus,* v. 226, June 21, 1948, p. 2076-2077.

4c-67. Macrocristais de Metais. (Macrocrystalline Structure of Metals.) Francisco J. Maffei and Fausto W. Lima. *Boletim da Associacao Brasileira de Metais,* v. 4, July 1948, p. 333-343.

Method of preparation and properties of macrocrystals of Zn, Cd, Bi, and Sn.

4c-68. Fractographic Examination of Tungsten. C. A. Zapffe and F. K. Landgraf. *American Society for Metals, Preprint* No. 13, 1948, 23 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 396-417; discussion, p. 417-418.

Numerous fractographs based on technique of fractography as applied to the cleavage facets of cast carboniferous tungsten, cast aluminiferous tungsten, and pure tungsten made by the methods of powder metallurgy. Interpretation and evaluation of specimens shown.

4c-69. The Effect of Orientation on Knoop Hardness of Single Crystals of Zinc and Silicon Ferrite. F. W. Daniels and C. G. Dunn. *American Society for Metals, Preprint* No. 14, 1948, 21 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 419-438; discussion, p. 438-442.

Hardness was found to vary periodically with direction of the long diagonal of the Knoop indenter with respect to the crystal. A method is described for obtaining Knoop-hardness numbers of body-centered cubic crystals of unknown orientation.

4c-70. The Indium-Bismuth Phase Diagram. E. A. Peretti and S. C. Carapella, Jr. *American Society for Metals, Preprint* No. 29, 1948, 12 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 947-958; discussion, p. 958-960.

The system was investigated by thermal, X-ray, and metallographic methods. Presence of a eutectic at 66.3 wt. % and 72.1° C. was confirmed. 65 alloys investigated.

4c-71. Beta Laminations in Cartridge Brass. Ralph L. Dowdell, Charles A. Nagler, Morris E. Fine, Harold P. Klug, and Gust Bitsianes. *American Society for Metals, Preprint* No. 32, 1948, 17 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 985-999; discussion, p. 999-1000.

Strip cartridge brass laminated in manufacture, so that the resulting cups were unsatisfactory for car-

tridge cases. The phenomenon has previously been referred to as "phantom laminations in brass." The cause of the laminations. Microstructures and diffraction data.

4c-72. The Kappa Eutectoid Transformation in the Copper-Silicon System. Walter R. Hibbard, Jr., George H. Eichelman, Jr., and William P. Saunders. *Metals Technology,* v. 15, Sept. 1948, T.P. 2441, 9 pages.

Products of the above transformation as affected by transformation temperatures were studied by means of microscopic and hardness methods. This transformation of a Cu-Si alloy containing 5.56% Si was found to be extremely sluggish—requiring over a week at certain subcritical temperatures.

4c-73. Plastic Deformation of Large Grained Copper Specimens. Walter Hibbard, Jr. *Metals Technology,* v. 15, Sept. 1948, T.P. 2469, 21 pages.

Introduction of even a single grain boundary into a metal crystal in such a manner that areas deforming differently under stress are produced causes marked deviations from theoretical single-crystal behavior. These deviations consist of macroscopically inhomogeneous deformations resulting in measurable differences in crystal orientation within a single grain. 36 ref.

4c-74. An Observation on Diffusion During Homogenization of a Single Crystal of Alpha Brass. Robert Maddin. *Metals Technology,* v. 15, Sept. 1948, T.N. 6, 2 pages.

Deposits of zinc on brass foil used as a wrapper for a brass single crystal during homogenization treatment. The phenomenon remains unexplained.

4c-75. On the Crystal Structure of Silicon Carbide and its Content of Impurities. (In English.) Dick Lundquist. *Acta Chemica Scandinavica,* v. 2, no. 2, 1948, p. 177-191.

In connection with a general investigation of the properties of silicon carbide, extensive X-ray studies and spectrochemical analyses were conducted. The material was also studied by densitometric and microscopical methods. 12 ref.

4c-76. Twinning in Tetragonal Alloys of Copper and Manganese. Francis T. Worrell. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 929-933.

Studies were made of an 88%-Mn, 12%-Cu alloy. This alloy, when annealed at 925° C. and quenched to room temperature, has a tetragonal structure of axial ratio 0.97 which shows twinning along the 101 and 011 planes.

4c-77. Effect of Gases on Tin Bronze. Clyde L. Frear. *Foundry,* v. 76, Nov. 1948, p. 70-71, 142, 145-146.

Causes and effects of gas evolution in production of tin bronze. (To be concluded.)

4c-78. Some Factors Affecting the Rate of Grain Growth in Metals. J. E. Burke. *Metals Technology,* v. 15, Oct. 1948, T.P. 2472, 19 pages.

Experimental work on grain growth of commercial alpha brass. Effect of partial melting at the grain boundary upon rate of grain growth, effect of sheet thickness on rate of growth and effect of penultimate anneal at high temperatures. Data on high-purity brass. Semiquantitative explanation of some of the results. 15 ref.

4c-79. Surface Tension and Microstructure. III. The Thermal Etching of Silver. *Metal Industry,* v. 73, Oct. 29, 1948, p. 346, 353.

4c-80. Ueber das System Kobalt/Stickstoff. 13. Metallamide und Metallnitride. (The Cobalt-Nitrogen System. 13. Metallic Amides and Nitrides.) Robert Juza and Werner Sachsze. *Zeitschrift fur anorganische Chemie,* v. 253, March 15, 1945, p. 95-108.

The method of producing and of analyzing the Co-N compounds and the properties of Co_3N and Co_2N. X-ray examinations were made to determine the solubility of N in Co, the solubility of Co_3N, the width and position of the Co_3N monophase, the two-phase area Co_3N-Co_2N and the structure of Co_2N. 17 ref.

4c-81. Ueber in Wasserstoff reduziertes Kobalt. (Cobalt Reduced by Hydrogen.) H. Nowotny and R. Juza. *Zeitschrift fur anorganische Chemie,* v. 253, March 15, 1945, p. 109-112.

The coexistence of the cubic and hexagonal modification of Co in a certain temperature range. By X-ray inspection it is shown that hexagonal Co has a structure of alternating layers of hexagonal and cubic crystals. The formation of such variable structures and the mosaic patterns.

4c-82. Zur Kenntnis des Systems Mangan (Eisen)-Zinn. (Contribution to Knowledge of the Systems Mn-Sn and Fe-Sn.) Hans Nowotny and Konrad Schubert. *Metallforschung,* v. 1, July-Aug. 1946, p. 17-23.

Results of X-ray investigation, including interatomic distances, coordination ratios, and lattice structures of the various intermetallic compounds of these systems. 27 ref.

4c-83. Die Kristallstruktur von Ni_3Sn_4. (The Crystal Structure of Ni_3Sn_4.)

Hans Nowotny and Konrad Schubert. *Metallforschung,* v. 1, July-Aug. 1946, p. 23-31.

Results of X-ray investigation, including interatomic distances. Close relationship between the structure of Ni_3Sn_4 and the gamma phase, Ni_3Sn_2. The polarity of the residual salt-type bonding forces. 11 ref.

4c-84. Die Kristallstrukturen von Zn_9Th, Cd_2Ca, und $(Ag,Mg)_2Ca$. (The Crystal Structure of Zn_9Th, Cd_2Ca, $(Ag,Mg)_2Ca$). Hans Nowotny. *Metallforschung,* v. 1, July-Aug. 1946, p. 31-34.

X-ray investigation of these alloys.

4c-85. Die Kristallstruktur von CuZn-As. (The Crystal Structure of CuZn-As.) Hans Nowotny. *Metallforschung,* v. 1, July-Aug. 1946, p. 38-40.

Results of x-ray-diffraction examination.

4c-86. Die Kristallstruktur von Cu_2Te. (The Crystal Structure of Cu_2Te.) Hans Nowotny. *Metallforschung,* v. 1, July-Aug. 1946, p. 40-42.

Results of X-ray diffraction examination.

4c-87. Das Diffusionsverhalten von Edelmetallplattierungen. (The Diffusion Behavior of Precious Metal Electroplates.) Helmut Buckle. *Metallforschung,* v. 1, July-Aug. 1946, p. 47-52.

New method for application of microhardness testing to determination of the diffusion of plated and base metals into each other. Results for silver plated on aluminum. A simple and easy to determine coefficient of diffusion behavior.

4c-88. Ueber die Löslichkeit von Silber in Zink. (The Solubility of Silver in Zinc.) Astrid von Wiedebach-Nostiz. *Metallforschung,* v. 1, July-Aug. 1946, p. 56-60.

The limit of solubility of the n-solid solution was determined by X-ray diffraction. Results and the precipitation processes occurring during dissociation of the solid solution.

4c-89. Die Silber-Mangan-Legierungen. (The Silver-Manganese Alloys.) Ernst Raub and Annemarie Engel. *Metallforschung,* v. 1, July-Aug. 1946, p. 62-64.

The unexplained parts of the constitution diagram of Ag-Mn alloys by means of resistance measurements as well as thermo-analytical, microscopic, and X-ray methods.

4c-90. Plattierte Edelmetallkontakte. (Precious-Metal-Plated Electrical Contacts.) Ernst Raub. *Metallforschung,* v. 1, Sept. 1946, p. 71-75.

The mutual diffusion of the plating and the plated metal and the effect of particle transfer by electrolytic action on the plated surface and on the behavior of the contacts. The experiments were conducted on contacts plated with Au, Ag, and two gold alloys, containing 7% Pt and 5% Ni, respectively.

4c-91. Uber rucklӓufige Sättigungskurven bei der Ausscheidung von Mischkristallen aus der Schmelze. (Retrograde Solubility Curves in the Precipitation of Mixed Crystals From the Melt.) Ernst Raub and Annemarie Engel. *Metallforschung,* v. 1, Sept. 1946, p. 76-81.

Experiments show that, above certain temperatures, the solubilities of Ag and Au alloyed with Tl, Pb, and Bi first increase, then decrease as the temperature rises. 11 ref.

4c-92. Zur Kenntnis des Aufbaus und der Kristallchemie einiger Edelmetallsysteme Palladium-Blei, Palladium-Zinn, Iridium-Zinn, Rhodium-Zinn, Platin-Blei. (The Structure and Crystal Chemistry of Several Systems of Noble Metals—Palladium-Lead, Palladium-Zinc, Iridium-Zinc, Rhodium-Zinc, Platinum-Lead.) Hans Nowotny, Konrad Schubert, and Ursula Dettinger. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 137-145.

Results of X-ray and metallographic examination of these systems. 18 ref.

4c-93. Die Legierungen des Aluminiums mit Indium und Thallium. (The Alloys of Aluminum With Indium and Thallium.) Ernst Raub and Max Engel. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 148-149.

In the alloys of aluminum with the low-melting-point metals of the third periodic group, the alloying affinity decreases with increasing atomic number.

4c-94. Ubermikroskopische Untersuchungen zur Aufklärung der Ausscheidungsvorgänge in Berylliumbronze. (Submicroscopic Studies for Clarification of Precipitation Processes in Beryllium Bronzes.) Johanna Hunger, Franz Pawlek, and Robert Seeliger. *Metallforschung,* v. 1, Dec. 1946, p. 168-174.

Results of electron microscopic examination and microhardness testing of a Cu-Be alloy containing 2.83% Be.

4c-95. Das Diffusionsverhalten von Edelmetallplattierungen. (Diffusion Behavior of Precious-Metal Electroplates.) II. Helmut Buckle. *Metallforschung,* v. 1, Dec. 1946, p. 175-181.

A new coefficient for the diffusibility of platings. Mathematical proof that the annealing time-diffusibility curve is, as a rule, a para-

bola. The behavior of the metal pairs Ag-Al, Ag-Zn, and Ag-Ca.

4c-96. Berichtigung der Systeme Cer-Magnesium und Lanthan-Magnesium. (Determination of the Cerium-Magnesium and Lanthanum-Magnesium Systems.) Rudolph Vogel and Theo Heumann. *Metallforschung,* v. 2, Jan. 1947, p. 1-8.

Results of thermal, microscopic, and X-ray investigation of the above systems (up to 50% Mg). 14 ref.

4c-97. Uber eine ternäre Verbindung im System Aluminium-Silizium-Natrium. (A Ternary Compound in the Aluminum-Silicon-Sodium System.) Hans Nowotny and Erich Scheil. *Metallforschung,* v. 2, March 1947, p. 76-80.

The production and properties of $NaAlSi_4$, and results of X-ray examinations.

4c-98. Röntgenuntersuchungen im System Magnesium-Quecksilber. (X-Ray Investigations in the System Magnesium-Mercury.) Georg Brauer, Hans Nowotny and Rudolf Rudolph. *Metallforschung,* v. 2, March 1947, p. 81-84.

Results of experiments made to determine the crystal structures of Mg_3Hg and Mg_5Hg_3.

4c-99. Die Kristallstruktur von Co_2P. (The Crystal Structure of Co_2P.) Hans Nowotny. *Zeitschrift fur anorganische Chemie,* v. 254, Sept. 1947, p. 31-36.

The production and examination of Co-P alloys containing 5.5 to 35% P; intensities for revolving crystal and powder recordings and comparison with the calculated intensities. The lattice constants, parameters, and interatomic spacings. 10 ref.

4c-100. Die Atomverteilung in den flussigen Elementen Pb, Tl, In, Au, Sn, Ga, Bi, Ge und in flussigen Legierungen des Systems Au-Sn. (Atom Distribution in the Molten Elements Pb, Tl, In, Au, Sn, Ga, Bi, Ge, and in the Molten Alloys of the Au-Sn System.) Hans Hendus. *Zeitschrift fur Naturforschung,* v. 2a, Sept. 1947, p. 505-521.

A special X-ray apparatus was used for the study. It is shown that the coordination numbers of melts and crystals are never the same. 35 ref.

4c-101. Röntgenographische Untersuchung von Karbidsystemen. (X-Ray Investigations of Carbide Systems.) Hans Nowotny and Richard Kieffer. *Metallforschung,* v. 2, Sept. 1947, p. 257-265.

The lattice constants of TiC, ZrC, VC, CbC, TaC, WC, and Mo_2C were redetermined and compared with previous values. Results indicate that the systems TiC-VC, TiC-CbC, ZrC-CbC, CbC-TaC, (Ta,Cb)C-VC, VC-TaC, and TiC-TaC are miscible in all proportions, probably also TiC-ZrC. 27 ref.

4c-102. Ein Beitrag zum System Titankarbid-Wolframkarbid. (The Titanium Carbide-Tungsten Carbide System.) Hans Nowotny and Gisela Glenk. *Metallforschung,* v. 2, Sept. 1947, p. 265-269.

X-ray investigations showed that TiC dissolves about 70% WC, while WC dissolves only 5 to 10% TiC. The determined lattice changes are much less than was indicated in earlier reports. Reasons for the variable values and irregularities in the lattice constants. 10 ref.

4c-103. Notiz uber die Systeme Eisen-Kadmium und Eisen-Blei. (Note Concerning the Systems Iron-Cadmium and Iron-Lead.) Erich Scheil. *Metallforschung,* v. 2, Oct. 1947, p. 320.

E. J. Daniels reported in 1932 the existence of the phases Cu_2Fe and Pb_2Fe, respectively, in the above systems. Results of X-ray investigation indicate that no such compounds are formed on reaction of Fe with Cd or Pb.

4c-104. Anwendungen des Bandmodells der Elektronentheorie auf die Kristallchemie der Legierungen. I. (Applications of the Band Model of the Electron Theory to the Crystal Chemistry of Alloys. I.) Konrad Schubert. *Metallforschung,* v. 2, Nov. 1947, p. 349-352.

Discusses qualitatively the different bond-energy contributions in Ni_2Al_3 and related types of alloys. Investigation of zone structures showed that a strong decrease in the kinetic energy of the valence electrons occurred. Certain anomalies in the Zn-Al solid solution in the neighborhood of 50 Zn, 50 Al are explained.

4c-105. Segregation in Manganese Bronze. George E. Dalbey. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 111-115; discussion, p. 115-118.

Previously abstracted from *American Foundryman,* v. 12, Oct. 1947, p. 35-39; discussion, p. 39-42. See item 4-177, 1947. Also appeared as preprint 47-34, 1947.

4c-106. The Influence of Crystal Face on the Electrochemical Properties of a Single Crystal of Copper. Henry Leidheiser, Jr. and Allan T. Gwathmey. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 95-106; discussion, p. 107-110.

Abstracted from preprint. See item 4-27, 1947.

4d—Light Metals

4d-1. The Recrystallization Temperature of Beryllium. W. A. Alexander, J. K. Swinton, and L. M. Pidgeon. *Canadian Institute of Mining and Metallurgy, Transactions*, v. 50 (Bound with *Canadian Mining and Metallurgical Bulletin)*, Dec. 1947, p. 657-662; discussion, p. 662-664.

An unusual method was used, since per cent elongation in tension is practically zero, so that ordinary squeezing or rolling was not possible. It was found possible to strain the metal without cracking by applying a load of 150 kg. to a ½-in. cube with a ⅛-in. steel ball. Samples were annealed at different temperatures in a hydrogen atmosphere then examined for change in structure, to find the lowest temperature at which recrystallization would appear. This was found to be about 810° C.

4d-2. X-Ray Studies of Twinning and Untwinning in Magnesium Alloys. J. B. Hess and R. L. Dietrich. *Metals Technology*, v. 15, Feb. 1948, T.P. 2328, 5 pages.

In order to explain the results of cyclic stressing in alternate tension and compression upon the tangent elastic modulus of the above, Dorn and Thomsen have postulated that, following twinning under applied compression, a retwinning or untwinning occurs as a result of residual microtensile stresses immediately upon removal of the applied compressive force. Carapella and Shaw have used this supposition in discussing results of indentation hardness and cold drawing of Mg sheet. However, the authors have been unsuccessful in detecting any evidence of this phenomenon.

4d-3. Anomalies in the Appearance of Glide Ellipses. Robert Maddin. *Metals Technology*, v. 15, Feb. 1948, T.P. 2332, 6 pages.

Electropolishing has generally been assumed to eliminate the strain introduced by mechanical polishing and to result in a more truly representative surface, particularly in the case of soft metallic materials. However "glide ellipses" were found to occur on electropolished surfaces of 99.975% pure Al crystals. Elongation and shear on specimens mechanically polished, then electropolished, and finally strained by use of a tensile machine, were determined by X-ray diffraction. Results are described and illustrated, but no attempt is made to explain the apparent anomalies observed.

4d-4. Influence of Inclusions on Properties of Sand Cast Aluminum-Base Alloys. G. Sachs, A. W. Dana, and L. J. Ebert. *American Foundrymen's Assoc., Preprint No.* 47-26, 1947, 7 pages.

Studies six common aluminum-base alloys as to their tendency to form inclusions and also as to the manner in which their properties are affected by size and location of inclusions.

4d-5. Inclusions—A Critical Study. H. G. Warrington. *Light Metals,* v. 11, Feb. 1948, p. 96-98.

Discusses critically a recent article by M. Bardot in *Fonderie* which reviewed published information on inclusions in light alloys. (See R.M.L., v. 4, 1947, item 4-144.) Present author believes that some of the published information is misleading, especially to one not in close contact with industrial practice.

4d-6. Porosity—Another Approach. F. A. Allen. *Light Metals,* v. 11, Feb. 1948, p. 98-101.

Discusses paper by Davidlee von Ludwig, *Iron Age,* Nov. 20, 1947, (R.M.L., v. 4, 1947, item 3-392) which deals with the causes of porosity in aluminum. Also work of several others.

4d-7. The Ternary System: Aluminum-Magnesium-Lithium. Part I. Method of Working With Lithium. Binary Systems. Part II. Phase Diagrams for Additional Cross Sections. (In Russian.) F. I. Shamrai. *Izvestiya Akademii SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), Nov.-Dec. 1947, p. 605-615; Jan.-Feb. 1948, p. 83-94.

Methods used in working with Li and results of an investigation of the Mg-Li, Al-Li, and Al-Mg systems. Thermal and microstructural analysis of cross sections at 5, 10, 15, 20, 50, and 60 atomic % Li, and also for the compositions Al_3Mg_4-AlLi and Al-Mg_2Li.

4d-8. Experimental Study of Electron Density in Crystals. Part I. Electron Density of Aluminum. (In Russian.) N. V. Ageev and D. L. Ageeva. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), Jan.-Feb. 1948, p. 17-28.

The f-curve of Al was determined by X-ray diffraction, using certain lines of Fe and Cu as standards and thin specimens obtained by vacuum deposition. A method is proposed for determining optimum temperatures for calculation using

the different metals as standards and for extrapolation to other temperatures. The distributions of electron densities in the (001), (011), and (111) directions of the Al lattice were determined by Fourier series analysis at 4000°; and the curve for the (001) direction at 20° was determined by extrapolation. It was shown that the atoms of metallic Al are incompletely ionized. 20 ref.

4d-9. Low Temperature Transformations in Lithium and Lithium-Magnesium Alloys. C. S. Barrett and O. R. Trautz. *Metals Technology,* v. 15, April 1948, T. P. 2346, 23 pages.

General characteristics of above transformations, including the phenomenon of audible "clicks" accompanying certain transformations. Method of sample preparation and diffraction technique used in the study. Effects of cold work and of temperatures down to 63° K. 22 ref.

4d-10. Slip at Grain Boundaries and Grain Growth in Metals. N. F. Mott. *Proceedings of the Physical Society,* v. 60, April 1948, p. 391-394.

A mathematical presentation of a theory for the slip process based on experiments with aluminum.

4d-11. Investigation of the Influence of Grain Size on the Relationship Between Compression Rates and Stresses During Plastic Deformation. (In Russian.) L. D. Sokolov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Jan. 1948, p. 89-92.

Cylindrical specimens of aluminum of different grain size were compressed at rates between 0.01 and 1 mm. per sec. It was found that the "rate coefficient" has a lower value for specimens with a smaller grain size. The dependence of rate coefficient behavior on the increase of deformation in the case of high and low-melting metals and alloys. 12 ref.

4d-12. Kristalvorm en groeisnelheid bij Rekristallisatie van Aluminium. (Crystal Formation and Speed of Growth by Recrystallization of Aluminum.) W. G. Burgers and W. May. *Metalen,* v. 2, April 1948, p. 172-179.

Results of an investigation on stretched Al single crystals and polycrystalline material. Twinning and "stimulation" of crystals.

4d-13. Crystal Orientation in Al by Slow Neutron Diffraction. G. Arnold and A. H. Weber. *Physical Review,* v. 73, June 1948, p. 1385-1389.

Investigations of crystal orientation effects in various forms of aluminum by measurement of total cross sections in the approximate neutron-energy range 0.003 to 0.05 ev.

4d-14. Etude aux Rayons X de la Structure des Alliages Aluminium-Plomb et Aluminium-Plomb-Magnésium. (X-Ray Investigation of the Structure of Aluminum-Lead and Aluminum-Lead-Magnesium Alloys.) Mladen Paic. *Revue de Métallurgie,* v. 44, Nov.-Dec. 1947, p. 363-373.

Different aspects of segregation of Pb in the above alloys of high Al content. Effects of Pb content, temperature, and method of casting on alloy structure. It is believed that the method of addition of Pb is of importance. 14 ref.

4d-15. Contribution a l'etude des alliages aluminium-zinc-magnésium et aluminium - zinc - magnésium - cuivre. (Contribution to the Study of Aluminum-Zinc-Magnesium and Aluminum-Zinc-Magnesium-Copper Alloys.) Adrien Saulnier. *Comptes Rendus* (France), v. 226, Jan. 12, 1948, p. 181-182.

A-ZG (7.5% Zn; 2.5% Mg; remainder, Al) and A-ZGU (7.5% Zn; 2.5% Mg; 1.5% Cu; remainder, Al) were investigated with regard to the phases present at various temperatures.

4d-16. Dispersion des vitesses des ondes acoustiques dans l'aluminium. (The Rate of Propagation of Acoustic Waves in Aluminum.) Ph. Olmer. *Acta Crystallographica,* v. 1, May 1948, p. 57-63.

Intensity measurements of X-ray diffuse scattering by single crystals of aluminum at ordinary temperatures which give information on mode of propagation of transverse and longitudinal elastic waves in the crystal. 18 ref.

4d-17. Uber den Zerfall ubersattigter Magnesium-Mischkristalle. (The Decomposition of Supersaturated Magnesium Solid Solutions.) Walter Bulian and Eberhard Fahrenhorst. *Zeitschrift fur Naturforschung,* v. 1, May 1946, p. 263-267.

The temperature of precipitation from Mg-Al solid solutions was found to be poorly defined. Annealing caused decomposition of Mg solid solutions with Th, Pb, Zn, Ag, Zn, Ca, Bi, and Mn. Structures formed by precipitating Mg-Al alloys with various elements and by annealing at different temperatures.

4d-18. Effect of Composition on Grain Growth in Aluminum-Magnesium Solid Solutions. Louis J. Demer and Paul A. Beck. *Metals Technology,* v. 15, June 1948, T.P. 2374, 16 pages.

As previously reported, isothermal

grain growth in high-purity Al and in an Al alloy with 2% Mg can be adequately described by means of an empirical equation. In this paper, isothermal grain-growth data are presented for Al-Mg alloys with 0.025, 0.12, and 1.8 to 2.05% Mg, from 350 to 600° C., and for 20 sec. to 11 days.

4d-19. Solubility of Iron in Solid Aluminum. J. K. Edgar. *Metals Technology,* v. 15, June 1948, T.P. 2389, 5 pages.

Solubility was determined using 99.99%+ Al. Data show that solubility decreases from 0.052% at the eutectic temperature (655° C.) to 0.006% at 500° C. It was also found that the Al-Fe alloys are not subject to precipitation hardening after solution heat treatment at 600 and aging at 250° C.

4d-20. Internal Friction in the Interstitial Solid Solutions of C and O in Tantalum. T'ing-Sui Ke. *Physical Review,* v. 74, July 1, 1948, p. 9-15.

Some internal-friction measurements from which it was concluded that C and O form interstitial solutions with tantalum. This observation is the first evidence that oxygen forms an interstitial solid solution with a metal. Location of C and O in the tantalum lattice.

4d-21. Stress Relaxation by Interstitial Atomic Diffusion in Tantalum. T'ing-Sui Ke. *Physical Review,* v. 74, July 1, 1948, p. 16-20.

Theoretical analysis of relaxation phenomena and experimental tests to determine relaxation strength by rigidity measurements and stress relaxation measurements.

4d-22. The Lattice Spacings of Solid Solutions of Different Elements in Aluminum. H. J. Axon and W. Hume-Rothery. *Proceedings of the Royal Society,* ser. A, v. 193, April 22, 1948, p. 1-24.

Measurements were made of the lattice spacings of solid solutions of Li, Mg, Si, Cu, Zn, Ge, and Ag in Al. Results are interpreted in terms of atomic structure. 26 ref.

4d-23. On the Inhomogeneity of Plastic Deformation in the Crystals of an Aggregate. W. Boas and M. E. Hargreaves. *Proceedings of the Royal Society,* ser. A, v. 193, April 22, 1948, p. 89-97.

The variation of plastic deformation in aluminum specimens consisting of large crystals was determined by measuring elongation and hardness at various points after tensile deformation. The deformation varied from grain to grain, and also within each grain deformation near the boundary was greater or smaller than at the center according to whether the neighbor was more or less deformed—there is not necessarily inhibition of slip near grain boundaries. Results are of importance for calculation of the stress-strain curve of aggregates from those of single crystals. It is suggested that a mechanism other than slip operates near the grain boundaries during deformation, and even within the crystals during large extensions.

4d-24. The Energies of Electrons in Aluminium. Z. Matyas. *Philosophical Magazine,* v. 39, June 1948, p. 429-449.

How it is possible to construct the probable band structure of aluminum by means of the general Bloch method. Interpretations of some principal features of soft X-ray emission spectra of aluminum. 11 ref.

4d-25. Deformation Characteristics of Magnesium. F. A. Fox. *Metal Treatment and Drop Forging,* v. 15, Summer 1948, p. 79-82.

Main principles underlying the deformation of the metal. 18 ref.

4d-26. Calciumsilizid als intermediärer Bestandteil in stranggegossenen Rundbarren aus einer Kolbenlegierung der Silumin-Gruppe. (Calcium Silicide as an Interstitial Constituent of Cast and Pressed Billets From a Piston Alloy of the Silumin Group.) H. Wolf. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 400-403.

In the above, the calcium silicide phase adversely affected the strength and corrosion properties of the metal. Its source was traced, and methods devised to eliminate it.

4d-27. Forme des cristaux et vitesse de croissance lors de la recristallisation de l'aluminium. (Crystal Form and Rate of Growth During Recrystallization of Aluminum.) W. G. Burgers. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 44, Nov.-Dec. 1947, p. 292-295.

Calls attention to certain peculiarities in the shape of the grain boundaries between aluminum crystals, which can be explained by differences in the rate of growth of adjacent crystals.

4d-28. The Effect of 1% Silicon on the Constitution of Aluminium-Magnesium-Manganese-Zinc Alloys at 460° C. H. J. Axon and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 74, Feb. 1948, p. 315-329.

The constitution of Al-Mg-Mn-Zn-Si alloys containing 1% Si was determined for alloys containing 0 to 6% Mg, 0 to 4% Mn, and 0 to 8%

Zn after annealing to equilibrium at 460° C. Results are presented graphically for alloys containing 1% Si; and 0, 4, and 8% Zn. 10 ref.

4d-29. Sur le comportement des joints de grains au cours du processus de fusion de l'aluminium tres pur. (Behavior of Grain Boundaries During Melting of Very Pure Aluminum.) Georges Chaudron, Paul Lacombe, and Nicolas Yannaquis. *Comptes Rendus,* v. 226, April 26, 1948, p. 1372-1373.

It was found that the metal forming the body of the grains has a slightly higher melting point than the metal in the grain boundaries.

4d-30. The Lattice Spacings of the Solid Solution of Copper in Aluminium. E. C. Ellwood and Jeanne M. Silcock. *Journal of the Institute of Metals,* v. 74, May 1948, p. 457-467.

Lattice spacings were determined by high-temperature X-ray measurements from 400 to 600° C. Microexamination and room-temperature X-ray measurements were used for comparison. The effect of equivalent atomic percentages of copper in distorting the aluminum lattice increases with increasing temperature, owing to the relatively greater differences in the atomic radius of the two elements caused by the difference in thermal expansion. The coefficient of thermal expansion decreases with increasing Cu content. 15 ref.

4d-31. Etude aux rayons X de la texture fine de cristaux d'aluminium. (X-Ray Study of the Fine Structure of Aluminum Crystals.) André Guinier and Jacques Tennevin. *Comptes Rendus,* v. 226, May 10, 1948, p. 1530-1532.

Results of study using a method which permits observation of imperfections not apparent by the Laue method. Monocrystals of aluminum subjected to various treatments were examined.

4d-32. A Note on the Aluminium-Manganese G Phase. K. Little and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 74, June 1948, p. 521-524.

Previous work has shown the existence of a metastable phase, denoted G, in Al-rich alloys of Al and Mn made from high-purity metals and annealed at low temperatures. Debye-Scherrer films of this phase were taken and measured. A survey was made of the effects of Si, Fe, Co, Ni, Cu, Mg, Zn, and Cr on the stability of the G phase in Al-Mn alloys.

4d-33. Ternary Systems: Aluminum-Magnesium-Lithium. III. Description of Ternary Systems of Al-Mg-Li; Projection of the Surface of the Liquidus; Isotherms at 400° C. and 20° C.; and Process of Crystallization. (In Russian.) F. I. Shamrai. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), May-June 1948, p. 290-301.

An equilibrium diagram of the above system was constructed and the alloys in this system investigated along cross-sections parallel to the binary system, Al-Mg, and to Al_3Mg_4 and $Al\text{-}Mg_2Li$. Results indicate the specific tendency of Li toward formation of manifold solid phases of variable composition as much on the basis of pure metal as on inter-metallic compounds. The high melting points of these phases are emphasized.

4d-34. Mise en évidence d'imperfections de structure de gros cristaux de solution solide Al-Zn au cours de leur durcissement structural. (Evidence of Structural Imperfections Formed in Large Crystals of the Al-Zn Solid Solution During Their Structural Hardening). Paul Lacombe and Aurel Berghezan. *Comptes Rendus,* v. 226, June 28, 1948, p. 2152-2154.

As in the case of pure Al, monocrystals of Al-Zn containing 8, 10, and 12% Zn, obtained by recrystallization after strain hardening, consist of conglomerations of small crystals having slightly different orientations.

4d-35. The Solubility of Hydrogen in Liquid and Solid Aluminum. C. E. Ransley and H. Neufeld. *Journal of the Institute of Metals,* v. 74, Aug. 1948, p. 599-620.

Precision determination techniques used and results obtained for both cases. Empirical equations relate solubility to hydrogen pressure and absolute temperatures. Shows that the porosity of a standard sand-bar cast in commercial-purity Al is a linear function of the hydrogen content of the metal. 13 ref.

4d-36. Manganese-Zinc Phase Diagram From 0 to 50% Zinc. E. V. Potter and R. W. Huber. *American Society for Metals, Preprint* No. 30, 1948, 24 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1001-1022; discussion, p. 1022-1023.

Determined by X-ray and thermal analysis methods using alloys prepared by powder methods. Procedure and results.

4d-37. Recrystallization and Preferred Orientation of Beryllium by X-Ray Diffraction. B. M. Thall and J. A. Newcombe. *Canadian Mining and Metallurgical Bulletin,* v. 41 *(Transactions,* v. 51), Sept. 1948, p. 521-524.

Results obtained by back-reflection and transmission methods of examination of specimens subjected to cold work and to hot straining show that commercial Be develops a high degree of anisotropy during either extrusion or compression. The information obtained concerning directional properties may lead to development of coldworking procedures for Be.

4d-38. Mécanisme de la précipitation dans les alliages ternaire Al-Si-Mg et quaternaire Al-Cu-Si-Mg (Mechanism of Precipitation in Ternary Al-Si-Mg and Quaternary Al-Cu-Si-Mg Alloys.) André Guinier and Honoré Lambot. *Comptes Rendus,* v. 227, July 5, 1948, p. 74-75.

Results of X-ray study of mechanisms of precipitation of these magnesium alloys.

4d-39. Some Effects of Applied Stresses on Precipitation Phenomena. Walter L. Finlay and Walter R. Hibbard, Jr. *Metals Technology,* v. 15, Sept. 1948, T.P. 2470, 18 pages.

Two widely differing binary precipitation-hardening systems were investigated: 12% Zn in Al and 4% Cu in Al. Effects of the application of uniaxial tensile creep stress during elevated temperature aging of both systems and of hydrostatic pressure during the elevated temperature aging of 12% Al-Zn. Evidence for existence of solution-shearing movements and for their importance in plastic deformation of precipitation hardening systems. Two novel investigating techniques termed "tensile creep aging" and "hydrostatic pressure aging".

4d-40. Effect of a Dispersed Phase on Grain Growth in Al-Mn Alloys. Paul A. Beck, M. L. Holzworth, and Philip R. Sperry. *Metals Technology,* v. 15, Sept. 1948, T.P. 2475, 30 pages.

Results of investigation of a series of high-purity Al-Mn alloys at various temperatures. The finely-dispersed Al-Mn compound was found to have considerable grain-growth-inhibiting effect. Details of the variation of this phenomenon with variations in heat treatment. 44 ref.

4d-41. The Constitution of the Aluminium-Rich Aluminium-Cobalt-Iron Alloys, With Reference to the Role of Transitional Elements in Alloy Formation. G. V. Raynor and M. B. Waldron. *Proceedings of the Royal Society,* ser. A, v. 194, Sept. 2, 1948, p. 362-374.

Results of study of the above alloys, by micrographic and X-ray methods. It is shown that close analogies exist between the alloys of Al with Fe and Ni, with Fe and Co, and with Co and Ni. 12 ref.

4d-42. Structure of Co_2Al_9. *Nature,* v. 162, Oct. 9, 1948, p. 565-566.

A. M. B. Douglas gives details of lattice parameters as determined from X-ray data by Fourier methods. G. V. Raynor and M. B. Waldron note agreement of these results with the theory that, in Al-rich alloys, transitional metal atoms absorb electrons by filling up their atomic orbitals.

4d-43. Uber eine neuartige Gefugeerscheinung in manganhaltigen Aluminiumlegierungen auf Grund von licht- und elektronenmikroskopischen Untersuchungen. (A New Structure in Low-Manganese Aluminum Alloys Revealed by Light and Electron-Microscopic Examinations.) M. Dudek, H. Mahl, and H. J. Seemann. *Metall,* March 1948, p. 75-80.

The annealed and water-quenched structure of duralumin is not homogeneous, but contains fine Mn containing crystals which are rendered visible only by use of a suitable etchant. The author considers the discovery of this phase to be of great importance to the further development of aluminum alloys.

4d-44. Untersuchungen uber das System Cermischmetall-Wasserstoff. (Research on Cerium-Hydrogen Solid Solutions.) K. Dialer. *Monatshefte fur Chemie,* v. 79, Aug. 1948, p. 296-310.

Careful experiments showed that cerium can absorb hydrogen to the point of saturation even at room temperature. Aging phenomena are shown to be confined to the surface of the metal and calculations of equilibria at various temperatures indicate the probability of reaction with hydrogen. 16 ref.

4d-45. L'état "polygonisé" du cristal métallique. (The "Polygonized" Condition of Metallic Crystals.) A. Guinier and P. Lacombe. *Métaux & Corrosion,* v. 23, Sept. 1948, p. 212-214.

Discusses phenomenon, which plays an important part in recrystallization of metals, on the basis of some experimental observations on aluminum and Al-Zn alloys.

4d-46. X-Ray Investigation of the Ag-

ing of Aluminum Alloys. I. Application of Monochromatic X-Rays for Structural Investigation of Aged Alloys. (In Russian.) Yu. A. Bagaryatskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 827-830.

A monochromator with curved quartz prism for stable emission. X-ray patterns of the monocrystalline alloys, Al-Cu and Al-Cu-Mg, obtained with monochromatic emission.

4d-47. Deformation of Flat Aluminum Crystals. (In Russian.) F. P. Rybalko and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, July 1948, p. 915-920.

It was found that elongation by 7 to 15% produces a region having an orientation different from that of the basic crystal.

4d-48. Inclusions in Aluminium Crystals. W. May, T. J. Tiedema, and W. G. Burgers. *Nature,* v. 162, Nov. 6, 1948, p. 740-741.

The orientation of the above pattern, using the etch method recently described by Lacombe and Beaujardor and X-ray methods (Laue transmission photographs). It was found that pits developed by the etching reagent have orientations corresponding quite closely with the four twin possibilities. It is deduced that in order to prepare large aluminum crystals by the stress-strain method without inclusions, one has to start with fine-grained material.

4d-49. Löslichkeitsbestimmungen mit Hilfe der Mikrohärtepruefung. (Solubility Determination by Means of Microhardness Testing.) Helmut Buckle. *Metallforschung,* v. 1, July-Aug. 1946, p. 43-47.

New method by means of which solubility of metal solid solutions is derived from curves of microhardness vs. percentage composition of the solute metal, when the latter is only soluble to the extent of approximately 1% or less. Data for pure Al, for Be in Al, for Ti in Al, and for Th in Al. 21 ref.

4d-50. Uber die Löslichkeit von Kalzium in Magnesium. (The Solubility of Calcium in Magnesium.) Walter Bulian and Eberhard Fahrenhorst. *Metallforschung,* v. 1, Sept. 1946, p. 70.

The above is briefly discussed. A graph shows solubility curves obtained by three different investigators.

4d-51. Untersuchungen an Aluminium-Gusslegierungen mit Kupfer und Silizium. (Research on Aluminum Alloyed With Copper and Silicon.) Franz Bollenrath and Hanns Gröber. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 111-116.

Results of experiments made to determine the constitution diagram of the Al-rich Al-Cu-S alloys. Properties were determined with and without additions of Mg, Fe, Mn, and Ti.

4d-52. Aluminiumlegierungen mit Magnesium, Silizium und Zink. (Aluminum Alloyed With Magnesium, Silicon, and Zinc.) Franz Bollenrath and Hanns Gröber. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 116-122.

Results of a study of the quasiternary constitution diagram of Al-$MgZn_2$-Mg_2S, and the planes of primary crystallization in the Al-rich section of the diagram. The effects of heat treatment and of Fe, Cu, and Mn additions. 14 ref.

4d-53. Der Aufbau magnesiumreicher Legierungen im System Magnesium-Mangan-Quecksilber. (The Structure of the Magnesium-Rich Alloys in the System Magnesium-Manganese-Mercury.) Hans Nowotny. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 130-136.

Results of work on the section of the Mg-Mn-Hg constitution diagram. 14 ref.

4d-54. Der Aufbau aluminiumreicher Legierungen im System Aluminium-Silizium-Beryllium. (The Structure of Aluminum-Rich Alloys in the Al-Si-Be System.) Hans Nowotny. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 146-148.

The investigated alloys contained a maximum of 16% Si and 6% Be. Results are presented in the form of constitution diagrams. 9 ref.

4d-55. Uber die Wirkung einer Schall and Ultraschallbehandlung auf das Gefuge von Magnesium-Aluminium-Legierungen mit 4 bis 12% Al. (The Effect of Sonic and Supersonic Vibrations on the Structures of Magnesium-Aluminum Alloys With 4 to 12% Al.) Charlotte Siebers and Walter Bulian. *Metallforschung,* v. 1, Oct.-Nov. 1946, p. 158-160.

Treatments were applied during solidification. The method of testing and the results. 10 ref.

4d-56. Uber das Verhalten des Magnesiums zu Calcium, Strontium und Barium. (The Behavior of Magnesium Towards Calcium, Strontium, and Barium.) Wilhelm Klemm and Fritz Dinkelacker. *Zeitschrift fur anorganische Chemie,* v. 255, Dec. 1947, p. 2-12.

Tests were made to determine the constitution diagrams of Mg-Ca, Mg-

Sr, and Mg-Ba. The method of experimentation. Differences between the three systems. 11 ref.

4d-57. Das Zustandsdiagramm Magnesium-Zirkonium. (The Magnesium-Zirconium Constitution Diagram.) F. Sauerwald. *Zeitschrift fur anorganische Chemie,* v. 255, Dec. 1947, p. 212-220.

The investigation covers a range of Mg-Zr alloys having a maximum of 5% Zr. Accurate determination of saturation points at different temperatures. Methods used and results.

4d-58. Influence of Inclusions on Properties of Sand Cast Aluminum-Base Alloys. G. Sachs, A. W. Dana and L. J. Ebert. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 102-108; discussion, p. 108-110.

Previously abstracted from preprint. See item 4d-4, 1948.

SECTION V

POWDER METALLURGY

5a—General

5a-1. Sintered Semiconductors. Henry H. Hausner. *Electronics*, v. 21, Jan. 1948, p. 138, 178, 180, 182, 184.

Production and fundamental principles of ceramic-metal compositions. Results of investigations of the effects of particle size and distribution, and of sintering temperature.

5a-2. Where Does Powder Metallurgy Stand Today? H. R. Clauser. *Scientific American*, v. 178, Jan. 1948, p. 12-15.

Reviews present status.

5a-3. Uses for Metal Powders. H. W. Greenwood. *Machinery Lloyd* (Overseas Edition), v. 19, Dec. 20, 1947, p. 81-82.

A brief survey.

5a-4. Powder Metallurgy; Its Potential Value to the Engineering Industry. H. W. Greenwood. *Metal Industry*, v. 71, Dec. 26, 1947, p. 519-520.

The value of powder metallurgy as a means of solving problems in the production of better wear resistant materials and of metals and alloys capable of withstanding high temperatures under load. Other applications.

5a-5. Sieve Test of Metal Powders. Rolla E. Pollard. *Journal of Research of the National Bureau of Standards*, v. 39, Dec. 1947, p. 487-505.

Reproducible results were obtained in sieve tests of sponge iron, electrolytic iron, electrolytic copper, and nickel, only when certain variables affecting the sieving characteristics of the powders were eliminated or controlled. One of these was a cumulative sampling error resulting from repeated riffle cutting of limited powder supplies. Another was the effect of exposure to humid atmospheres. The effects of both variables were demonstrated in tests with sponge iron Significant variations also were noted when the same powders were sieved with different sets of certified sieves. 22 ref.

5a-6. Apparatus for Air Classification of Metal Powders. E. C. Truesdale. *Proceedings Third Annual Spring Meeting, Metal Powder Association*, 1947, p. 35-50; discussion, p. 50-51.

A laboratory instrument based on air elutriation according to Stokes' Law was developed and found to be capable of accurate fractionation at particle diameters up to 40 microns for spherical particles and to give reproducible results for spherical or nonspherical particles (excepting flakes) up to 75 microns. Modification permitted conversion to a continuous feed, multiple-stage classifier which was capable of sharp particle-size cuts with high recovery of fines.

5a-7. Electrical and Electronic Components From Powdered Metals. Erle I. Shobert, II. *Proceedings Third Annual Spring Meeting, Metal Powder Association*, 1947, p. 57-66.

The discussion is limited to five main types of applications; electrical contacts, metal-graphite brushes, permanent magnets, soft magnetic materials, and high-frequency iron cores.

5a-8. Powder Metallurgy; Review of Progress in 1947. W. D. Jones. *Metal Industry*, v. 72, Jan. 9, 1948, p. 23-24. 28 references.

5a-9. Progress in Powder Metallurgy. E. J. Sandford. *Metallurgia*, v. 37, Dec. 1947, p. 95-99.

Reviews 1947 developments. 47 ref.

5a-10. The Effect of Particle Size on the Electrical Properties of Sintered Materials. Henry H. Hausner. *Powder Metallurgy Bulletin*, v. 3, Jan. 1948, p. 4-8.

Theoretical considerations and experimental results for three groups of Cu powders and for the systems ZrO_2-talc-Cu and ZrO_2-talc-graphite. Results agree closely with theory.

5a-11. Metal Density Assured. *Steel*, v. 122, Feb. 9, 1948, p. 96.

Press equipment for metal powder, in which pressures are applied

simultaneously from top and bottom as well as from sides.

5a-12. Factors Governing the Particle Size Grading of Pulverized Materials. R. North. *Industrial Chemist and Chemical Manufacturer,* v. 24, Jan. 1948, p. 5-11.

Results obtained by different techniques.

5a-13. Industrial Application of the Powder Metallurgy Process. A. J. Langhammer. *Metal Progress,* v. 53, March 1948, p. 387-389.

An address delivered at Stevens Institute of Technology, on receipt of the 4th annual medal awarded by the Institute for outstanding achievement in the field of powder metallurgy.

5a-14. Powder Metallurgy Has Some Limitations. Thomas J. Hughel and Stuart T. Ross. *Industry and Power,* v. 54, April 1948, p. 89-90.

Powder metallurgy is not a "cure all". The method has made possible products that cannot be obtained in the form desired by any other technique. Inherent physical limitations of the process; lack of fundamental knowledge; cost factors.

5a-15. Physical Processes Involved in Sintering. D. H. Bangham. *Journal of the Society of Glass Technology,* v. 31, Oct.-Dec. 1947, p. 264-266.

Fundamental principles. Applicable to both metals and nonmetals.

5a-16. Powder Metallurgy as a Research Tool. F. N. Rhines. *Powder Metallurgy Bulletin,* v. 3, March 1948, p. 28-38.

Special advantages powder metallurgy has for the research metallurgist interested in studies of fundamental properties of metals and alloys.

5a-17. Powder Metallurgy—Its Current Problems—Its Prospects. Robert L. Ziegfeld. *Iron Age,* v. 161, April 8, 1948, p. 72-74.

Increased usage of powder metallurgy and wider dissemination of information and statistics and standardization of powder specifications and testing methods are essential to optimum development in the future. The directions research is taking.

5a-18. Powder Metallurgy as Applied to Permanent Magnets. A. E. Franks. *Iron Age,* v. 161, April 8, 1948, p. 82-85.

Procedures for developing the necessary properties including precautions that must be observed in order to obtain optimum results. Also indicates that several new magnetic materials, now in the development stage, possess many desirable characteristics that promise further broadening of the field of powder metallurgy in the magnet industry.

5a-19. Powder Metallurgy; Low Cost Equipment for Volume Production. Robert Talmage. *Iron Age,* v. 161, April 8, 1948, p. 86-91.

A potential method for combating rising material and labor costs is in application of powder-metallurgy techniques in large-scale production of small parts. Various components that can be accurately and rapidly manufactured with relatively inexpensive equipment. Costs of making a typical part in the screw machine and from metal powder.

5a-20. Production of Ferrous and Nonferrous Metal Powders. G. L. Miller. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 8-14.

Processes used for the production of metal powders are classified in 11 groups. Applications of each method and characteristics of the powder produced by it. A tabulation of methods of production and properties of powders of the common industrial metals.

5a-21. Production of Sintered Permanent Magnets. S. J. Garvin. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 67-72.

Stages in the production of sintered permanent magnets using Fe-Ni-Al alloys. Very good and consistent results have been achieved by using binary alloys of aluminum with iron or cobalt in the preparation of powders, and by taking extreme precautions against oxidation during pressing and sintering.

5a-22. The German Hard-Metal Industry. G. J. Trapp, B. E. Berry, H. Burden, A. E. Oliver, and T. Raine. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 92-98.

Developments in techniques of preparing and processing materials in the manufacture of hard metals. Results of researches into the structure and physical properties of hard metals and their constituents.

5a-23. Notes on German Developments in Noncarbide Powder Metallurgy (1939-1945). C. J. Leadbeater. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 191-202.

A brief survey of developments in production of metal powders, manufacture of sintered components, the

types of equipment used in pressing and sintering, research on the mechanism of sintering. 175 ref.

5a-24. The Powder Metallurgy of Porous Metals and Alloys Having a Controlled Porosity. Pol Duwez and Howard E. Martens. *Metals Technology,* v. 15, April 1948, T.P. 2343, 27 pages.

Method of "sweat cooling" for jet-engine parts. An important problem is to develop porous alloys having maximum permeability and minimum porosity, thus achieving maximum tensile strength. Development of a method which consists essentially of mixing a suitable substance with the metal powder, pressing the mixture, and sintering. During heating, but before sintering, the substance dissociates thus creating the desired porosity. Physical properties of a porous stainless steel and a porous Ni-Mo-Fe alloy prepared in this manner.

5a-25. Powder Metallurgy—Its Widening Sphere of Usefulness. Claus G. Goetzel. *Engineers' Digest,* (American Edition), v. 5, March-April 1948, p. 96.

5a-26. High Temperature Materials by Powder Metallurgy. Claus G. Goetzel. *Iron Age,* v. 161, April 29, 1948, p. 78-81.

The need for refractory alloys for parts to be subjected to high temperatures has led to work on materials free from the limitations imposed by casting and forging. Of several powder metallurgy procedures possible, the so-called infiltration technique appears to be the most promising. Metallurgical advantages of this method and also refractory oxides and ceramic components.

5a-27. Mechanism of Sintering. A. J. Shaler and John Wulff. *Industrial and Engineering Chemistry,* v. 40, May 1948, p. 838-842.

The authors conclude that the metal flows viscously under the influence of surface tension and gas pressure. Using a simplified model, rates of shrinkage of copper compacts at 850° C. were calculated and measured. Preliminary measurements confirmed the nature of the mechanism but indicated a slightly higher viscosity coefficient than is predicted on the basis of the self-diffusion coefficient of copper. 18 ref.

5a-28. Friction in Powder Metallurgy. H. W. Greenwood. *Metallurgia,* v. 37, April 1948, p. 283-284.

Effect on the preparation of powdered-metal compacts.

5a-29. Designing Parts Made From Sintered Metal Powder Compacts. Herbert Chase. *Electrical Manufacturing,* v. 41, May 1948, p. 100-105, 136-138.

Specific rules to consider in establishing economic production. Die and product designs.

5a-30. Le Moulage et le Frittage des Poudres Métalliques. (Molding and Sintering of Metal Powders.) Georges Blanc. *Fonderie,* Jan. 1948, p. 1007-1021.

Recent developments. 27 ref.

5a-31. Préparation des poudres métalliques par Electrolyse Ignée. (Preparation of Metallic Powders by Electrolysis.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, Jan.-Feb. 1948, p. 12-14.

Technique developed, including method for separation of the crystals from the bath. Choice of the bath solution, and of material for the anode, cathode, and diaphragm.

5a-32. Metal Ceramics; A New Field in Powder Metallurgy. H. H. Hausner. *Metal Industry,* v. 72, May 14, 1948, p. 405-407.

Based on paper presented at annual Spring meeting of the Metal Powder Assoc.

5a-33. Protective Atmospheres; Comparison of Methods Available for the Sintering Process. N. K. Koebel. *Metal Industry,* v. 72, May 21, 1948, p. 426-427.

5a-34. Compressibility Factor; Development of a General Formula. G. B. Smith. *Metal Industry,* v. 72, May 21, 1948, p. 427.

An empirical formula for use in estimation of the compressibility of a metal powder or blend of powders is presented and checked by use on three different blends of Cu-base powders.

5a-35. Comportement des poudres sous l'action de la pression. (Behavior of Pulverized Substances Under Pressure.) Rene Lecuir. *Comptes Rendus* (France), Jan. 12, 1948, p. 191-193.

Pressure tends to cause the formation of agglomerates having an oriented structure, provided that air inclusions do not interfere. Such orientation may be modified by the flow of the material.

5a-36. Nickel-Iron Alloy Dust Cores. S. E. Buckley. *Electrical Communication,* v. 25, June 1948, p. 126-131. Reprinted from "Symposium on Powder Metallurgy." *Iron and Steel Institute,* London, May 1947, p. 59-63.

Development and properties for use in telecommunications equipment. Variation of permeability with magnetizing field for sheet and for various powdered-alloy cores,

and also other electrical properties. Relationship to structure. 10 ref.

5a-37. Sintering in the Presence of a Liquid Phase. F. V. Lenel. *Metals Technology,* v. 15, June, 1948, T.P. 2415, 19 pages.

In contrast to the mechanism of sintering of pure metal powders, sintering in the presence of a liquid phase cannot be treated as one unified mechanism because there are really several mechanisms depending upon the type of alloy system and the field of its constitutional diagram in which the sintering takes place. The situation in which the liquid is present during the entire time while the compacts are at sintering temperature, and that in which the liquid phase is formed during sintering, but disappears before sintering is completed, by diffusion and solid-solution formation. Microstructural and density changes taking place. 69 ref.

5a-38. Die Reaktionsfähigkeit fester Stoffe und deren Wert fur die Pulvermetallurgie. (The Reactivity of Solids and Its Importance in Powder Metallurgy) J. A. Hedvall. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 296-298.

A general discussion based on available literature. Effects of various factors such as temperature, magnetic and electrical conditions, ultrasonic vibration. 11 ref.

5a-39. Die Löslichkeitsregel in der Metallkeramik. (Solubility Rules for Powder-Metal Compacts). H. Umstätter. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 299.

Substances dissolve each other more readily the more nearly alike are their thermal vibration frequencies. The importance of this rule in the production of powdered metal compacts.

5a-40. Die "Konstruktion von Legierungen" als metallkeramisches Problem. ("Construction of Alloys"—A Powder Metallurgy Problem.) G. Ritzau. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 305-307.

Theoretical analysis indicates possibility of preparing combinations by sintering techniques whose constitution diagram prohibits production by melting and casting.

5a-41. Sinterverbundstoffe aus Metallen und nichtmetallischen Stoffen, vorzugsweise Oxyden. (Sintered Combinations of Metals and Nonmetals, Especially Oxides). F. Skaupy. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 307-308.

The development of powdered-metal compacts, ceramic bodies, and their combinations. The two main groups of metal-ceramic compositions, and important factors in their production.

5a-42. Die Entwicklung der metallkeramischen Lager. (Development of Powdered-Metal Bearings.) F. Eisenkolb. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 345-352.

Properties, advantages, and uses; methods of finishing bearing surfaces; effects of type of powder and of lubrication on efficiency of bearings; methods of testing the bearings. Three principal methods for producing the bearings. 22 ref.

5a-43. Die Metallkeramischen Werkstoffe im Gleitlagerbau. (Powder-Metal Compacts for Bearings.) St. Fronius. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 352-356.

Effect of powder size and shape on porosity and frictional properties of powdered-metal bearings. Emphasizes effects of method of production, of porosity, and of specific weight on quality of the finished bearing. 21 ref.

5a-44. Ueber die Metallpulvererzeugung nach dem Hametag-Verfahren. (Production of Powdered Metals by the Hametag Process.) Helmut Kramer. *Metall,* Nov. 1947, p. 73-76.

New type of mill pulverizes by means of "whirling impact." The principle of self-crushing has been perfected to such an extent in the new mill that crushing as a result of wear of the mill parts is less than 1% of the total crushing.

5a-45. The Sintering of Metal Powders. Robert Talmage. *Industrial Gas,* v. 27, July 1948, p. 11-12, 24-27.

General explanation and methods for copper, brass, and iron-powder sintering.

5a-46. Metallurgical Books. (Continued.) Sibyl E. Warren. *Metals Review,* v. 21, July 1948, p. 41-43.

Continues classified bibliography of metallurgical books published during 1936-1946. This installment lists those dealing with powder metallurgy and casting. (To be continued.)

5a-47. Uber einige neue Verfahren der Pulvermetallurgie. (Several New Methods Used in Powder Metallurgy.) Gunter Wassermann. *Metallforschung,* v. 2, May 1947, p. 129-137.

The new methods are the production of sintered articles by sintering individual parts together, the drawing and rolling of tubes filled with powder, and the hot pressing of sinter cakes in a die.

5a-48. Powder Metallurgy Notes. J. Heuberger. *Metallurgia,* v. 38, July 1948, p. 169-171.

The production of components by the powder metallurgy method provides an alternative method of production which may be more economical in materials and labor costs than that usually adopted. The method is advantageous in some applications when high purity of the material is sought.

5a-49. Powder Metallurgy. Report of the International Symposium at Graz. *Metal Industry,* v. 73, Aug. 6, 1948, p. 103-105; Aug. 13, 1948, p. 129-130.

Reviews papers presented at the first international symposium of powder metallurgy held in Graz, Austria, on July 12-17.

5a-50. Powder Metallurgy. Alden M. Burghardt. *Journal of Chemical Education,* v. 25, Sept. 1948, p. 517-520.

Surveys processes and applications.

5a-51. Cermets, Ceramic-Metal Compounds. *Ceramic Industry,* v. 51, Sept. 1948, p. 108.

New ceramic-metal compounds that give promise as a material for use in jet engines and rockets. They include not only oxides and metal combinations, but mixtures such as oxides, carbides, nitrides, borides, and silicates on the one hand, and metals and alloys on the other.

5a-52. Le microscope électronique et la métallurgie des poudres. (The Electron Microscope and Powder Metallurgy.) Pierre Grivet and others. *Revue de Métallurgie,* v. 45, Jan.-Feb. 1948, p. 38-48.

Methods and applications. 11 ref.

5a-53. Préparation des poudres métalliques par électrolyse ignée. (Preparation of Metallic Powders by Fused-Salt Electrolysis.) J. L. Andrieux. *Revue de Métallurgie,* v. 45, Jan.-Feb. 1948, p. 49-59.

Details of method and its advantages and disadvantages. The most important disadvantage is the difficulty of separation of the powders from the melt. However, the method made it possible to obtain a series of pure powdered metals which could not be obtained in any other way.

5a-54. First International Powder Metallurgy Conference. *Metallurgia,* v. 38, Aug. 1948, p. 227-230.

Summarizes papers presented at conference in Graz, Austria.

5a-55. Application of the Theory of Diffusion to the Formation of Alloys in Powder Metallurgy. Pol Duwez and Charles B. Jordan. *American Society for Metals, Preprint* No. 37, 1948, 19 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 194-211; discussion, p. 211-212.

Theory and means by which it is possible to predict approximately the time and temperature required for complete homogenization by diffusion of a mixture of two metal powders. An experimental investigation of the progress of diffusion in compacts of mixed copper and nickel powders. Results and experimental errors.

5a-56. Some Wetting Properties of Metal Powders. Bernard Kopelman and C. C. Gregg. *American Society for Metals, Preprint* No. 40, 1948, 11 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 293-302.

The wetting characteristics of a series of metallic and inorganic powders were investigated qualitatively by examination of suspensions of the powders in the two-phase systems, kerosene-water, and water-carbon tetrachloride. Additional tests were made in which wetting properties were modified by addition of small amounts of hydrogen peroxide and other wetting agents to the water phase and oleic acid to the oil phase.

5a-57. Contribution to the Theory of Sintering. Paul Schwarzkopf. *Powder Metallurgy Bulletin,* v. 3, Sept. 1948, p. 74-87.

Presents an extensive discussion of the probable mechanism of sintering. After thorough consideration of the experimental work and theories proposed by others, it is concluded that plastic flow plays a determining part in all stages of the sintering mechanism and that in the first two stages, diffusion is an important contributing factor. Also points out that plastic flow and surface diffusion do not take place independently of each other.

5a-58. Effetti di soglia nelle fasi di alta dispersione. (Influence of the "Threshold Effect" on Highly Dispersed Phases). Francesco Mazzoleni. *La Metallurgia Italiana,* v. 39, March-April 1947, p. 86-88.

The "threshold effect" refers to a critical grain size for powdered materials, especially metals. A theoretical, mathematical analysis of this effect, including a method for its identification and calculation.

5a-59. Alloying of Metal Powders by Diffusion. Sidney Weinbaum. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 897-900.

In preparation of alloys by sintering metal powders, the alloy is

formed by diffusion of metals into each other. The distribution of metallic powder in space is expressed by means of a triple series; this series is used to obtain the solution of the diffusion equation. The resulting formula gives the concentration of metal as a function of space, time, temperature, and particle size. Sample calculations for a Ni-Cu alloy.

5a-60. Metal Powders: Production of Ferrous and Non-Ferrous Metal Powders. G. L. Miller. *Canadian Metals & Metallurgical Industries,* v. 11, Oct. 1948, p. 18-22, 44, 46.

Various methods. Production methods and characteristics of the more important types.

5a-61. New Getter Materials for the High-Vacuum Technique. Werner Espe. *Powder Metallurgy Bulletin,* v. 3, Oct. 1948, p. 100-111.

The use of getter materials in high-vacuum technique is based on the ability of certain metals to eliminate free gases by adsorption, absorption, or occlusion. The "coating getters" are usually metal powders applied to electrode surfaces by sintering; "flash getters" are those applied by vacuum deposition. The new materials in each group.

5a-62. "Cermets". G. A. Bole. *Engineering Experiment Station News* (Ohio State University) v. 20, Oct. 1948, p. 26-27. Reprinted from *O.C.I.A. News Letter,* v. 19, July 30, 1948.

Production, properties, techniques, and processes for ceramic-metal compositions.

5a-63. Preparation des poudres métalliques par électrolyse ignée. (Preparation of Metallic Powders by Fused-Salt Electrolysis.) (Concluded.) M. Andrieux. *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, July-Aug. 1948, p. 77-78.

Electrolytic production from silicides, phosphides, carbides, arsenides, antimonides, and sulphides. The difficulties involved in separation of the products are believed not to be insurmountable, and future prospects appear bright.

5a-64. Powdered-Metal Friction Material. Francis J. Lowey. *Mechanical Engineering,* v. 70, Nov. 1948, p. 869-875.

Production and application to different types of brake bands and similar devices.

5a-65. Trends in Powder Metallurgy. Claus G. Goetzel. *Mining and Metallurgy,* v. 29, Nov. 1948, p. 606-609. Based on Chapter 36 of forthcoming book, "Treatise on Powder Metallurgy", Vol. 2. Interscience Publishers, Inc.

5a-66. Die-Casting Dies; The Production of Cavity Inserts From Sintered Metal Powders. H. K. Barton. *Metal Industry,* v. 73, Oct. 29, 1948, p. 353.

Although further experimental work is needed before the process can be used commercially, the process has many attractive possibilities. Advantages and disadvantages of sintered metal-powder pressings in the die-forming field.

5a-67. Current Trends in Powder Metallurgy. Walter F. Toerge. *Steel,* v. 123, Nov. 22, 1948, p. 73-78, 80, 111-112, 115.

26 ref.

5a-68. Zur Beziehung zwischen dem röntgenographischen und dem arithmetischen Mittelwert der Teilchengrössen. (The Relation Between the Radiographic and Arithmetic Average of Particle Sizes.) Horst Muller. *Zeitschrift fur Naturforschung,* v. 2a, Aug. 1947, p. 473-474.

The radiographically determined size distribution of powder particles must always be larger than the arithmetically determined average.

5b—Ferrous

5b-1. Hot Pressing Metal Powders. *Iron Age,* v. 161, Jan. 22, 1948, p. 60 Based on paper by G. Wassermann in *Metallforschung,* v. 2, 1947, p. 129.

By applying a wash of iron powder and water to the adjacent surfaces of the cold-pressed component parts of a large piece (a large hollow cylinder), and by applying pressure to the top of the piece during sintering, it was possible to sinter the parts into one compact body.

5b-2. Stainless Steel Powder. John D. Dale. *Proceedings Third Annual Spring Meeting, Metal Powder Association,* 1947, p. 4-11; discussion, p. 11-13.

Development in the laboratory of Charles Hardy, Inc. Effects of various factors in the sintering process, physical properties.

5b-3. New Developments in the Production of Metal Powder Parts. E. E. Ensign. *Proceedings Third Annual Spring Meeting, Metal Powder Association,* 1947, p. 14-20.

Some new developments in production of powdered iron parts at Ford Motor Co. Results of preliminary work, equipment and products.

5b-4. Cost Calculations in the Production of Powder Metallurgy Parts. Henry H. Hausner. *Proceedings Third Annual Spring Meeting, Metal Powder Association,* 1947, p. 21-29.

Concerned only with iron-powder

parts, although the methods used are no doubt applicable to other powdered metals.

5b-5. Evaluation of the Molding, Coining, and Sintering Properties of Iron Powder. Jerome F. Kuzmick. *Metals Technology,* v. 15, Jan. 1948, T.P. 2308, 20 pages.

Methods for the evaluation are described and results obtained by their application to one grade of Swedish iron powder.

5b-6. Magnetic Properties of Iron Powder Compacts. Robert Steinitz. *Metals Technology,* v. 15, Feb. 1948, T.P. 2335, 11 pages.

Results of a systematic experimental study. It is shown that the raw material has negligible effect on properties if compared for identical densities rather than for identical processing procedures. A theory for the effect of sintering temperature is proposed.

5b-7. Nickel Steels by Powder Metallurgy. Laurence Delisle and Walter V. Knopp. *Metals Technology,* v. 15, Feb. 1948, T.P. 2340, 20 pages.

Metal powders, in the proportion corresponding to S.A.E. 2330 steel, were mixed with graphite, pressed, and sintered at different temperatures up to 1325° C. and for different periods of time up to 6 hr. It was found that diffusion was incomplete unless sintering were carried out at a high temperature for much longer periods. Since such a procedure is commercially impracticable, production of a special structure consisting of a hard constituent, rich in nickel, dispersed in a tough pearlitic matrix by means of partial diffusion, was attempted. Diffusion was found to take place sufficiently to change the mechanical properties of the steel markedly as compared to plain carbon steel. Advantage can be taken of partial diffusion of Ni to obtain a hardened structure on sintering followed by rather slow cooling, without additional conventional heat treatment.

5b-8. Ferrum Iron With Copper. *Metal Powder News,* v. 8, Feb. 15, 1948, p. 1.

Physical properties of iron-powder sinters containing 8% Cu.

5b-9. Métallurgie des Poudres Métalliques: Aciers au Nickel. (Metallurgy of Powdered Metals: Nickel Steels). Laurence Delisle and Walter V. Knopp. *Revue de Métallurgie,* v. 44, July-Aug. 1947, p. 245-255.

Preparation of nickel steels from a mixture of metal powders and graphite by diffusion in the solid phase, without melting. At 1325° a steel containing 3.5% Ni, 0.23% C, 0.75% Mn, and 0.20% Si was prepared and had a tensile strength of 99.9 kg. per sq. mm. and 3% elongation after quenching and tempering. Diffusion was not complete in any case, and powdered alloys were substituted for pure metals to obtain a homogeneous product. These nickel steels have Ni-rich martensitic crystals in a Ni-poor pearlite matrix. Further research is contemplated.

5b-10. Production of Iron Powder by Electrodeposition. G. E. Gardam. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 3-7.

Experiments on production of iron powder on a pilot-plant scale by electrolysis of 10% ferrous ammonium sulphate solution at 35° C., at a pH of 2.5, and at 200 amp. per sq. ft., half the current being fed through iron anodes and half through lead anodes in porous pots. Preliminary experiments on electrodeposition and grinding of brittle flake iron and electrolytic reduction of ferrous hydroxide.

5b-11. Some Properties of Engineering Iron Powders. C. J. Leadbeater, L. Northcott, and F. Hargreaves. **Determination of Specific Surface of Iron Powders by a Modification of the Air-Permeability Method.** F. M. Lea. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 15-36.

Methods of testing and techniques for determining particle, apparent, and tap densities of the powders, and densities of sintered compacts. Results of a study of surface texture, particle size, shape factor, and crystal structure by microexamination. Oxygen, hydrogen, and nitrogen contents were determined. Properties of commercial powders. Properties of sintered compacts. A summary and comparison of test data. The paper by Lea is an appendix to the first paper. 22 ref.

5b-12. The Nature, Properties, and Applications of Carbonyl-Iron Powder. L. B. Pfeil. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 47-51.

History of development of carbonyl-iron powder. Iron powder made by the carbonyl process possesses outstanding electromagnetic properties. Production conditions, and tentative explanations of the cause of the special form and properties of the powder. 12 ref.

5b-13. Comparison of Magnetic Powder Cores for High and Low Fre-

quencies. G. R. Polgreen. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 52-58.

A comparison of properties of these various cores and of the materials from which they may be constructed.

5b-14. Nickel-Iron Alloy Dust Cores. S. E. Buckley. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 59-63.

Development of dust cores to meet increasing demand for use in telecommunications equipment. Requirements for such uses, a high and constant permeability and low losses in the core being the most important. Use of electrolytic iron, Permalloy (Ni-Fe), and Mo-Permalloy. Constancy of permeability and its influence on design; calculating dust-core permeability from inherent properties of the metal, and core losses. 10 ref.

5b-15. High-Magnetic-Permeability Powder-Iron Components. D. A. Oliver. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 63-66.

Commercial applications of magnetic iron powders and the desirable characteristics. Results of investigations on grading, molding pressure, sintering and temperature.

5b-16. The Properties of Certain Iron Powder Compacts. J. P. Burr and W. Clarke. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 113-116.

Tables of results of experiments to determine effect of length on density of electrolytic iron powders compacted under various pressures and effect of addition of 1% stearin on tensile properties of the compacts. Values for probable pressure losses at the centers of compacts.

5b-17. Iron-Carbon Alloys by Powder Metallurgy. J. A. Judd. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 117-122.

Advantages and limitations with respect to ease of compaction, ease of sintering, decarburization, and die wear. It is concluded that for the higher carbon alloys (hypereutectoid and graphitic steels) there is some advantage in the use of mixtures of iron powder with iron carbide and graphite powder, since iron carbide liquates at sintering temperature, thereby strengthening the bond and improving physical properties. This method may also be used for the incorporation of alloying elements which are normally diffused during sintering only with great difficulty.

5b-18. Pressing, Sintering, Heat Treatment, and Properties of Iron-Graphite Powder Mixtures. R. Chadwick and E. R. Broadfield. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 123-141.

Experimental results for electrolytic powder, a charcoal-reduced Swedish powder, and a German powder made by the Degussa process.

5b-19. Observations on the Pressing, Sintering, and Properties of Iron-Copper Powder Mixtures. R. Chadwick, E. R. Broadfield, and S. F. Pugh. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 151-157.

Results of a study made of the effects of variations in particle size, sintering pressure and temperature on properties of Fe-Cu compacts containing up to 35% Cu.

5b-20. German Sintered Iron Driving Bands. W. Ivory. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 203-208.

Size and organization of the wartime production of iron powder and the development, manufacture, and testing of sintered iron driving bands.

5b-21. Powder Metallurgy; Notes on Steel and Alloy Steels. H. W. Greenwood. *Iron and Steel,* v. 21, May 1948, p. 183-184.

German practice and new information furnished by Iron & Steel Institute Special Report No. 38 on the recent Symposium on Powder Metallurgy.

5b-22. Magnetic Properties of Iron Powder as Affected by Changes in the Surface Conditions of the Particles. Gustav F. Huttig and Helmut Rainer. *Powder Metallurgy Bulletin,* v. 3, May 1948, p. 48-60.

Results of an extensive experimental investigation, after surveying the literature on the subject. Effects of various factors and treatments including packing density, alcohol treatment, etching in air, etching followed by rusting, air oxidation at 200° C., eosin staining, and hydrogen reduction.

5b-23. Particle-Size Distribution in Powder Metallurgy. *Journal of the*

Franklin Institute, v. 245, June 1948, p. 517-520.

Investigation of conditions contributing to lack of reproducibility in sieve analyses of metal powders.

5b-24. Making Wheels for Toy Locomotives. *Machinery* (London), v. 72, June 17, 1948, p. 735-736.

Wheels for toy locomotives are pressed from powdered iron on a standard Stokes 19-station rotary press.

5b-25. Zur Technologie des Sintereisens (Technology of Powdered Iron.) H. Wiemer. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 323-326.

Effect of powder structure and density on mechanical properties of cold pressed sintered soft iron. From graphs of carbon content (up to 1%) vs. density, approximate tensile strength, elongation and Brinell hardness of a powdered-iron compact can be determined. Tensile strength and hardness can be considerably increased by heat treatment. Fatigue strength approximates that of light-metal alloys.

5b-26. Uber die Gewinnung von Eisenpulver und seine Verwendbarkeit. (Production and Use of Iron Powder). F. Eisenkolb. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 327-335.

Different methods for pulverizing iron and steel; methods of classification; required compressibility of the powder; and strength of the finished product. Various present and potential uses. Experimental data. 21 ref.

5b-27. Herstellung von Eisenpulver fur Sinterkörper aus reinsten Eisenerzkonzentraten. (Production of Iron Powder for Sintered Bodies From Very Pure Iron Ore Concentrates.) W. Luyken and H. Kirchberg. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 335-345.

Magnetite ores from northern Sweden, when concentrated and reduced to powder, were suitable for powder metallurgy. The samples were concentrated to about 72% Fe, before reduction in hydrogen at 600-650° C. The properties of the products were equal to those made from other iron powders. 10 ref.

5b-28. Untersuchungen uber die Abnahme des Gehaltes von Kohlenstoff, Schwefel- und Sauerstoff während des Sinterns von Eisenpulver in einer Wasserstoffatmosphare. (Investigation of the Decrease in the Carbon, Sulphur, and Oxygen Content During Sintering of Iron Powder in a Hydrogen Atmosphere.) G. F. Huttig. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 359-361.

Previously abstracted from translation in *Powder Metallurgy Bulletin,* v. 2, Sept. 1947, p. 80-84. See item 5-65, 1947.

5b-29. Time and Temperature Effects in the Sintering of Iron Powders. Hans Bernstorff. *Metal Treatment and Drop Forging,* v. 15, Summer 1948, p. 85-89.

Some experimental studies made in the Degussa laboratories on the sintering of DPG-Schleuder iron powder. Tensile properties were determined after up to 10 hrs., sintering at 850 to 1300° C. 12 ref.

5b-30. Powdered-Iron Electrodes. I. Influence of Degree of Dispersion and of Composition of the Iron Powder on the Properties of Iron Electrodes. (In Russian.) L. L. Kuz'min and L. V. Borisova. *Zhurnal Prikladnoi Khimii.* (Journal of Applied Chemistry), v. 21, April 1948, p. 378-388.

Properties of iron electrodes depending on method of production of the powder by hydrogen reduction of iron oxide. 21 ref.

5b-31. Making Iron Powder in the Tunnel Kiln. V. H. Gottschalk. *Bureau of Mines, Information Circular* No. 7473, Aug. 1948, 16 pages.

Among the procedures developed by the Germans for providing the tonnage of iron powder needed to make rotating bands for artillery shells is the use of a ceramic tunnel kiln, not only for finishing the reduction of centrifugal powders but also for making so-called "brickyard sponge iron", which, after crushing and grinding, seems to yield a suitable product.

5b-32. Compacting of Iron Powders. *Iron Age,* v. 162, Nov. 25, 1948, p. 96-98. Translated and condensed from article by F. Eisenkolb, *Stahl und Eisen,* v. 66/67, 1947, p. 78.

A German investigation. Influence of grain size and pretreatment of powder upon lowest possible compacting pressure, and density and strength of resulting compacts.

5b-33. Kinetics of Sintering Compacted Iron Powder. G. F. Huttig. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 155-158.

A thermodynamic analysis of some investigations on the sintering of iron powders.

5c—Nonferrous

5c-1. German Production and Use of Boron Carbide and Titanium Boride. *Industrial Diamond Review,* v. 7, Nov. 1947, p. 343-344. Based on B.I.O.S. Final Report No. 925, Items 21 and 22.

5c-2. Sintered Carbides. Part I. Production and Properties. E. M. Trent. *Metal Industry,* v. 71, Dec. 19, 1947, p. 499-502.

Previously abstracted from *Engineer,* v. 184, Oct. 24, 1947, p. 396-397. See 5-74, R.M.L., v. 4, 1947 (*Metals Review,* Dec. 1947).

5c-3. Sintered Carbides. Part II. Specialized Applications in the Metal-Working Industries. H. Eckersley. *Metal Industry,* v. 71, Dec. 26, 1947, p. 521-523.

See 5-76, R.M.L., v. 4, 1947 (*Metals Review,* Jan. 1947).

5c-4. Bearings, Bushings and Allied Products. A. J. Langhammer. *Proceedings Third Annual Spring Meeting, Metal Powder Association,* 1947, p.32-34.

Properties and design principles of powder metallurgy bearings and other parts.

5c-5. Copper Lead Bearings From Metal Powder. E. R. Darby. *Proceedings Third Annual Spring Meeting, Metal Powder Association,* 1947, p. 52-54; discussion, p. 54-56.

Production of steel-backed Cu-Pb bearings. The alloy contains 20 to 45% Pb and usually less than 1½% of other elements. It is very difficult to cast, hence the use of the special metal-powder process developed by Federal-Mogul Corp. is very helpful.

5c-6. Manufacturing Bronze, Aluminum or Other Flake Metal Powders. Henry F. Mandle. *British Intelligence Objectives Sub-Committee, FIAT Final Report* No. 569, Dec. 27, 1945, 53 pages.

Military investigation of German industries.

5c-7. Pulverisation Fine des Cupro-Plomb. Fabrication des Coussinets Minces. (Fine Pulverization of Cupro-Lead. Manufacture of Thin Bearings.) René Delaplace. *Comptes Rendus* (France), v. 225, Dec. 1, 1947, p. 1075-1076.

Methods for preparing Cu-Pb powder from pure copper and lead. Sintering the powder for use in bearings.

5c-8. Preparation de Poudres Metalliques. (Preparation of Metallic Powders). Raymond Lautie. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1947, p. 974-977.

Preparation by reaction of an alkaline metal with an appropriate compound in a 2-stage furnace. Among the metals prepared were Sb, Bi, Be, Mg, Zn, Ca, Cu, Pb, Cr, Mo, W, and U. This method is said to be superior to the calcium carbide method for metals stable up to 1000° under vacuum, when extreme purity is required.

5c-9. Flake Metal Powders—Their Application, Manufacture, and Testing Methods. H. Meyersberg. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 37-46.

Methods of manufacture using the stamp and modified ball mill. Methods used in testing flake powders. Physical properties of flake and granular metal powders.

5c-10. The Preparation of Carbides. L. D. Brownlee, G. A. Geach, and T. Raine. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 73-78.

Methods used for preparation of carbides and double carbides of W, Ti and Ta. Details of typical commercial practice in the manufacture of powders for cemented carbides. 10 ref.

5c-11. The Manipulation and Sintering of Hard Metals. H. Burden. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 78-83.

Main stages in production of a consistent high-quality hard metal from prepared powders to the sintered product. The tungsten-carbide /cobalt group and the titanium-carbide/tungsten-carbide/cobalt group.

5c-12. The Physical Metallurgy of Sintered Carbides. E. J. Sandford and E. M. Trent. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.) "Symposium on Powder Metallurgy", Dec. 1947, p. 84-91.

Physical and chemical changes in cemented carbides in relation to the sintering process, the course of which has been followed by measurement of contraction and by microscopic examination. Appearance of other phases in alloys of tungsten carbide and cobalt in relation to the carbon content, and present knowledge of W-C-Co system. 13 ref.

5c-13. The Structure of Porous Bronze Bearings. A. Carter and A. G. Metcalfe. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 99-105.

A brief description of the usual method of manufacture of porous bronze bearings. An attempt is made to correlate the structure, determined by X-ray diffraction methods, with other properties. Some experimental sinterings were carried out on Cu-Sn-graphite alloys, and results obtained by various combinations of compacting pressure and sintering times and temperatures were compared with bearing properties.

5c-14. Highly Porous Metal Compacts, With Special Reference to Filters. C. E. Sinclair. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 105-109.

Their characteristics of flow and pressure-drop relationships of porous filters produced from graded spherical particles, together with micrographs showing pore size and shape. Typical applications and service results.

5c-15. Aircraft Liquid Deicing Equipment. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 110-112.

Conditions for ice formation on aircraft and details of early deicing systems. Development of liquid deicing system incorporating a porous-metal distributor with a sintered Cu-Ni-Sn compact as the porous medium.

5c-16. Sintered Iron-Copper Compacts. L. Northcott and C. J. Leadbeater. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 142-150.

A study of their properties.

5c-17. Powder-Metallurgy Bearing Materials; A Note on Powder-Metallurgy Methods Used in Great Britain for the Manufacture of Plain Bearings and Thrust Washers. W. H. Tait. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 157-161.

Unique qualities of powder-metallurgy methods utilized in production. Materials and methods used for obtaining porous, self-lubricating structures and nonporous structures which are difficult or impossible to manufacture by other means. Recent developments and future prospects. Influence of structure on behavior of Cu-Pb bearings and influence of elastic modulus on the properties of bearing materials.

5c-18. The Pressing and Sintering of Copper Powders. Maurice Cook and S. F. Pugh. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 162-173.

Results and micrographs obtained from a study of copper powders made by a variety of methods. The behavior in pressing and sintering is related to characteristic particle shape and to particle-size grading. Physical characteristics of the powders, compressibility, dimensional changes resulting from sintering, and tensile strength and ductility of sintered products. An explanation is offered for their behavior.

5c-19. The Production of Some Nonferrous Engineering Components by Powder Metallurgy. J. W. Lennox. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 174-184.

Practical significance of results obtained in an investigation of optimum conditions of pressing and sintering for production of the best physical properties in brass and bronze engineering components.

5c-20. Tungsten Carbide Dies; German Production For Wire, Bar and Tube Drawing. *Wire Industry,* v. 15, May 1948, p. 324, 326-327.

5c-21. From Research to Production; the Development of Copper-Lead Sintered Bearings. W. H. Tait. *Metal Industry,* v. 72, June 25, 1948, p. 521-523. (A condensation).

The art of developing a metallurgical idea from its initial conception to ultimate testing in practice is illustrated by the development of a bearing material with the good properties of the white metals and the fatigue strength of cast Cu-Pb.

5c-22. Entwicklung eines warm- und feuerfesten Werkstoffs mit niedrigem spezifischem Gewicht. (Development of a Heat and Fire Resistant Material of Low Specific Gravity.) J. Bingel. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 309-311.

Properties of two powder compositions containing 84 and 88% SiC, respectively. Addition of Fe, Co, or Ni reduces the sintering temperature of the carbide far below its melting point, while the melting metal simultaneously increases the strength of the compact.

5c-23. Zu der metallkeramischen Verarbeitung von Zinkpulver. (Powder Metallurgy of Zinc.) W. Wolf. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 361-363.

Effects of adding different amounts of graphite and copper (up to 4%) on mechanical properties of powder compacts.

5c-24. Nonferrous Metal Powders. D. C. Bradley. *Product Engineering,* v. 19, Sept. 1948, p. 102-104.

Physical properties of brass, copper, zinc, and bronze powders made by the atomization process; and the effect of phosphorus on brass powders. How sintering conditions affect parts.

5c-25. The Pore Size of Hydrogen Reduced Tungsten Powder. Bernard Kop-

elman and C. C. Gregg. *Metals Technology,* v. 15, Aug. 1948, T.P. 2434, 6 pages.

Evidence is presented for the existence of pores of molecular size. A method is proposed which may be useful in determining pore size of molecular dimensions in various materials, such as in sintered products.

5c-26. Préparation des poudres métalliques par électrolyse ignée. (Production of Metal Powder by Fused-Salt Electrolysis.) M. Andrieux. *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, May-June 1948, p. 54.

Production of Ca, Ce, and Ti from their borides. A new mechanism for the process is proposed. (To be continued.)

5c-27. The Sintering of Electrolytic Tantalum Powder. Rupert H. Myers. *Metallurgia,* v. 38, Oct. 1948, p. 307-310.

Effects of temperature and time of heating on some properties of pressed electrolytic tantalum powder. A sintering schedule for electrolytic tantalum powder which has yielded bars suitable for mechanical working.

5c-28. The Measurement of Grain-Size of Tungsten and Tungsten Carbide Powders Used for the Manufacture of Hard-Metal. H. Burden and A. Barker. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 51-68.

Several methods were used. A sedimentation balance and a turbidimeter both proved unsatisfactory, but a gross method using a Spekker absorptiometer gave good correlation with the particle size observed with an electron microscope. The major difficulty was the effect of aggregation of particles. Results show how tungsten of four different grain-sizes behaves during processing to finished hard metal. A relationship was established between hardness of the finished metal and particle size of the original tungsten. 21 ref.

5c-29. Porous Bronze Bearings. J. W. Lennox and G. Brewer. *Metal Industry,* v. 73, Nov. 26, 1948, p. 429-431.

Equipment and procedures for production; and applications.

5c-30. Aufbau und Mikrohärte der Zwei- und Dreistoffsysteme der Metalle Niob, Tantal, Molybdän und Wolfram. (Structures and Microhardnesses of the Binary and Ternary Systems of Columbium, Tantalum, Molybdenum, and Tungsten.) Helmut Buckle. *Metallforschung,* v. 1, July-Aug. 1946, p. 53-56.

High-vacuum equipment for producing sintered articles from high-melting metals. The structures of the resulting alloys were determined by X-ray methods.

5d—Light Metals

5d-1. Aluminum Components. R. L. Bickerdike. *Iron and Steel Institute, Special Report No.* 38, Ed. 2 (Rev.), "Symposium on Powder Metallurgy", Dec. 1947, p. 185-191.

Experiments on hot and cold pressing and sintering of Cu-Al powders. Results of microscopical examination, density and hardness measurements, and tensile testing. 12 ref.

5d-2. Uber Synthetische Körper aus Leichtmetallen. (Synthetic Light-Metal Products.) F. Sauerwald. *Archiv fur Metallkunde,* v. 1, July-Aug. 1947, p. 363-368.

Production of powdered-metal products from aluminum and magnesium and their alloys, which is difficult because of the presence of oxide films. German patents. Extrusion improves working properties. The applicability of common Al and Mg scrap; corrosion resistance of pure Mg.

5d-3. A Study of Process Variables in the Production of Aluminium Powder by Atomization. J. S. Thompson. *Journal of the Institute of Metals,* v. 74, Nov. 1947, p. 101-132.

Results of a study of the effects of certain variables upon the most important characteristics of the product and the method of operation. Particular attention is paid to the rate at which atomization proceeds, the size grading of the powder, and the ease and efficiency of operation. A general explanation of the mechanism of operation is outlined and a tentative equation developed to cover the dependence of rate of atomization upon the most important variables. Determination of the size distribution of the powder of subsieve size. 11 ref.

SECTION VI

CORROSION

6a—General

6a-1. Erosion-Corrosion. Walter A. Luce. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 29-32.

A form of attack which often causes unexpected and rapid deterioration of plant process equipment. Test equipment used at Ohio State for study of such problems.

6a-2. Ocean Put in Test Tube at Kure Beach. *Inco,* v. 21, no. 4, 1947, p. 4-9.

Test facilities and procedures.

6a-3. Corrosion of Filters in Sugar Refineries. Part III. Investigations on Hot Liquors. H. Inglesent and J. Anderson Storrow. *Industrial Chemist and Chemical Manufacturer,* v. 23, Dec. 1947, p. 827-834.

Tests were made on sugar liquors at plant operating temperatures to verify certain conclusions drawn from investigations of differences between electrode potentials of common constructional metals at room temperatures. In general, the metal pairs showed the same polarity at high and low temperatures where the differences were large.

6a-4. Selecting Alloys to Resist Cavitation Erosion. R. Beeching. *Product Engineering,* v. 19, Jan. 1948, p. 110-113.

Comparative data on the strength and erosion resistance of many alloys in fresh and sea water; factors to be considered in making a choice of alloy; jet impact, Venturi, and vibratory erosion testing techniques. The validity of various test results is evaluated.

6a-5. Corrosion and Methods of Protection. W. Wiederholt. *British Chemical Digest,* v. 2, Dec. 1947, p. 92-93. Translated and condensed from *Die Technik,* v. 2, March 1947.

A review.

6a-6. Chimney Liner Corrosion Resulting From Gas-Fired Furnaces. George B. Johnson. *Corrosion,* v. 4, Jan. 1948, p. 15-23.

Results of a continuing study of corrosion of actual installations in Minneapolis and of the effectiveness of different materials and coatings in resisting corrosion. (Presented at Annual Meeting of N.A.C.E., Chicago, April 5-8, 1947.)

6a-7. Recent Developments in the Use of Corrosion Inhibitors. Jay T. Nicholson. *Corrosion,* v. 4, Jan. 1948, p. 32-36.

Presented at N.A.C.E. Western Regional Division Meeting, Los Angeles, June 4, 1947.

6a-8. Corrosion of Metals With Oxygen Depolarization. *Light Metals,* v. 10, Dec. 1947, p. 637-638, 639-645.

Condensation (with some commentary) of Russian book by N. D. Tomashoff, published by Academy of Sciences, Institute of Physical Chemistry, U.S.S.R., Moscow and Leningrad, 1947. Fundamental problems of modern theory of the electrochemical corrosion of metals; local elements and corrosion; electrochemical heterogeneity of the corroding surface; thermodynamics and velocity of corrosion; protective surface films; factors determining the rate of corrosion process. (To be continued.)

6a-9. Corrosion in Boiler Feedwater Treating Systems—IV. (Concluded.) Leo F. Collins. *Power Generation,* v. 52, Jan. 1948, p. 106, 108.

Systems employing zeolite, acids, and degasification. Results of tests made to evaluate comparative corrosion resistance of materials used in deaerating heater trays, vent condenser tubes, and water heater tubes.

6a-10. L'Oxydation des Métaux. (Oxidation of Metals). N. F. Mott. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 44, Aug.-Sept. 1947. p. 172-180.

Assumes that metallic ions pass through the oxide layer to react with oxygen on the surface of the layer. This idea is examined mathematically for a compact metal film, either amorphous or crystalline. 13 ref.

6a-11. Corrosion of Metals With Oxygen Depolarization. *Light Metals,* v. 11, Jan. 1948, p. 8-14.

Continues condensation, with commentary, of Russian book by N. D. Tomashoff. Analytical method for calculating rate of corrosion processes; factors controlling rate of corrosion. (To be continued.)

6a-12. Sodium Chloride Versus Construction Materials. Part IV. (Concluded.) *Chemical Engineering,* v. 55, Jan. 1948, p. 223-224, 226, 228, 230, 232, 234.

Chemical Stoneware, by F. E. Herstein; Haveg, by E. P. Mampe; Durimet and Chlorimet, by Walter A. Luce; Aluminum, by Joseph P. Balash; Hastelloy, by C. G. Chisholm; Stainless Steel, by Grant L. Snair, Jr.

6a-13. Use of Inhibitors in Corrosion Control. Norman Hackerman. *Corrosion,* v. 4, Feb. 1948, p. 45-56; discussion, p. 56-60.

Use of a number of specific materials show that the effectiveness of a material as an inhibitor in one instance does not make it generally applicable. Theories of corrosion inhibition—particularly the relation of absorption to such action. 59 ref. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6a-14. Corrosion Problems in Communication and Radio Equipment Design. L. P. Morris. *Corrosion,* v. 4, Feb. 1948, p. 61-71.

A general discussion, including the action of fungi and methods for prevention by use of coatings. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6a-15. Oleophobic Monolayers. II. Temperature Effects and Energy of Adsorption. W. C. Bigelow, E. Glass, and W. A. Zisman. *Journal of Colloid Science,* v. 2, no. 6, 1948, p. 563-591.

Experimental methods for observing the effect of temperature on oleophobic films adsorbed from solution. Observed effects are discussed and a quantative kinetic treatment of them, in terms of adsorption-desorption equilibria, is given. The relationship of the observations and conclusions to fundamental aspects of adsorption from solution, corrosion inhibition, and wear prevention are discussed. 20 ref.

6a-16. Relationships of the Phases in Systems of Water Solutions and Metals. (In Russian.) A. I. Shultin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Aug. 1947, p. 739-753.

An extensive experimental investigation revealed that the oxidation-reduction properties of solutions depend not only upon the nature of the dissolved substance but also upon the pH. The chart of pH vs. Redox potential is used to estimate the corrosivity of different solutions toward different metals.

6a-17. Resistance of Materials to Fluorine and Hydrogen Fluoride. M. H. Brown. *U. S. Atomic Energy Commission,* MDDC-144, July 26, 1946, 2 pages.

Suitability of various common metals and alloys for use in contact with fluorine and HF, based on short-time tests.

6a-18. Galvanic Corrosion of Dissimilar Metals as Applied to Gas Hot Water Storage Heaters. Part I. Robert C. Weast. *American Gas Assoc.,* New York. Dec. 1947, 23 pages.

Describes test results obtained from a small-scale installation in an effort to obtain criteria for evaluating corrosion inhibitors.

6a-19. "Thermogalvanic" Effects in Corrosion. H. J. V. Tyrrell. *Metal Treatment,* v. 14, Winter 1947-48, p. 243-244, 248.

A neglected factor in electrochemical corrosion—the possible effect of temperature differences. Some recent experimental work has shown that, if two electrodes are immersed in a corrosive solution with a difference of temperature between them, attack concentrates on the cold one.

6a-20. Nitric Acid Versus Construction Materials. *Chemical Engineering,* v. 55, Feb. 1948, p. 233-234, 236, 238.

Part I of a symposium in which typical materials of construction are evaluated for services involving nitric acid. Includes the following: Iron and Steel, by A. W. Spitz; Rubber Lining, by O. S. True; Hastelloy, by C. G. Chisholm; Durimet, Chlorimet, by Walter A. Luce; Aluminum, by J. P. Balash and Ellis D. Verink, Jr.; and Precious Metals, by E. F. Rosenblatt.

6a-21. Three of the Eight Forms of Corrosion. Mars G. Fontana. *Metal Progress,* v. 53, Feb. 1948, p. 231-233.

Uniform attack, intergranular corrosion, and pitting. Not confined to ferrous metals. (To be continued.)

6a-22. Corrosion of Metals With Oxygen Depolarization. (Continued.) *Light Metals,* v. 11, Feb. 1948, p. 104-112.

Continues condensation of Russian book by N. D. Tomashoff. Concludes section on theory and describes experimental technique used in investigation of corrosion mechanisms. A graphical method for com-

putation of the rate of corrosion processes; methods and equipment for study of the efficiency of different cathode materials. (To be continued.)

6a-23. Corrosion of Filters in Sugar Refineries. Part IV—Investigations on Flowing Liquors. H. Inglesent, E. M. Manackerman, and J. Anderson Storrow. *Industrial Chemist and Chemical Manufacturer,* v. 24, Feb. 1948, p. 76-84.

Measurements were made of the differences between electrode potentials of common constructional metals in flowing sugar liquors at temperatures up to that in operating plant.

6a-24 . How to Combat Corrosion Through Design. Part I. Causes of Corrosion. Part II. Design Measures. (Concluded.) E. T. Collinsworth, Jr. *Machine Design,* v. 20, Feb. 1948, p. 116-122; March 1948, p. 142-148.

Part I reviews the fundamental principles of the different types of corrosion. Application to design is taken up in the second installment.

6a-25. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, March 1948, p. 75A, 77A.

Concentration-cell corrosion. Also outlines N.A.C.E. technical program to be presented in St. Louis, April 5-8, 1948.

6a-26. Corrosion Tests in Sulphuric Acid in Petroleum Refinery Processes. W. Z. Friend. *Corrosion,* v. 4, March 1948, p. 101-111.

Results of a number of plant corrosion tests and of several laboratory corrosion tests on a variety of alloys under conditions representative of some of the sulphuric-acid applications encountered in refineries. Tests reported were made with a spool-type specimen holder.

6a-27. Corrosion Inhibitors in Theory and Practice. Robert D. Misch and Hugh J. McDonald. *Wire and Wire Products,* v. 23, March 1948, p. 221-226, 260-264.

The mechanism of inhibitor action on the basis of present knowledge. Applications of inhibitors. 36 ref.

6a-28. Galvanic Corrosion and Concentration Cell Corrosion. Mars G. Fontana. *Metal Progress,* v. 53, March 1948, p. 382-386.

Mechanism of these types of corrosion and methods for their prevention.

6a-29. A Note on the Preparation, Suspension, and Testing of Corrosion Specimens. W. Murray. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 200.

In the course of experiments on the inhibition of corrosion of metals completely immersed in water, the duplication of results was found to be impossible. Modifications in the method of preparation and suspension of specimens overcame the difficulty. The improved method covers both single-metal and bimetallic specimens and testing at 90° F.

6a-30. Metallurgical Methods for Combating Corrosion and Abrasion in the Petroleum Industry. B. B. Morton. *Journal of the Institute of Petroleum,* v. 34, Jan. 1948, p. 1-59; discussion, p. 59-68.

Steps that have been taken within the petroleum industry of the U. S. to counteract the above and recent metallurgical developments within the industry. Emphasis is on use of a wide variety of nickel alloys although some others are mentioned.

6a-31. A Study of the Kinetics of Bearing Corrosion and Oil Oxidation: Correlation of Various Test Methods. Hugh R. Lehman, and L. Kermit Herndon. *Engineering Experiment Station News,* (Ohio State University), v. 20, Feb. 1948, p. 45-52.

A method of graphical analysis for the corrosion curves exhibited by the MacCoull Bearing Corrosion Tester. Application to such widely differing test methods as the Indiana stirring oxidation test and the oxygen-absorption method of Dornte is demonstrated. This indicates existence of a method of correlating the extensive bearing corrosion and oil oxidation data in the literature. 12 ref.

6a-32. Fretting Corrosion. *Lubrication,* v. 34, March 1948, p. 25-36.

A particular type of corrosion found on the contact areas of loaded metal surfaces subject to oscillatory or vibrating motion. The phenomenon is also known as "false brinelling" and as "friction oxidation". The nature of the process; the effects of load, surface finish, and materials; some suggested remedies, including use of lubricants.

6a-33. Corrosion Potential. *Industrial and Engineering Chemistry,* v. 40, April 1948, p. 16A, 22A.

Polarographic method for obtaining corrosion data quickly which is being developed at University of Oregon under sponsorship of Office of Naval Research. It is stated that it may soon be unnecessary to expose metal panels in sea water for months in order to determine corrosion characteristics and that sufficient corrosion data may be obtained in one hour to yield con-

clusions comparable to those based on seashore test-rack experiments.

6a-34. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, April 1948, p. 103A-104A.

Corrosion of steel, cast iron, and lead by sulphuric acid and the choice of materials for pipe lines.

6a-35. Chemical Research and Corrosion Control: Some Recent Contributions of a Corrosion Research Group. W. H. J. Vernon. *Corrosion,* v. 4, April 1948, p. 141-148. Condensed from *Journal of the Society of Chemical Industry,* v. 66, May 1947, p. 137-142...

Previously abstracted. See item 6-241, R.M.L., v. 4, 1947.

6a-36. Mechanism of Oxidation and Tarnishing. Ulick R. Evans. *Corrosion,* v. 4, April 1948, p. 149-171.

Previously abstracted from an Electrochemical Society Preprint. See item 6-49, R.M.L., v. 4, 1947.

6a-37. Fretting Corrosion — How to Eliminate It. E. V. Albert. *Steel,* v. 122, April 5, 1948, p. 72-76, 96, 98.

A progress report on investigations reported up to the present time on fretting corrosion, also known as false brinelling or friction oxidation—the corrosion occurring on contact areas of loaded metal surfaces subject to oscillatory or vibrating motion.

6a-38. Irreversible Electrode Potentials of Metals and Their Solid Solutions. Part I. Irreversible Electrode Potentials of Metals. Part II. Electrode Potentials of Solid Solutions. G. W. Akimov and G. B. Clark. *Transactions of the Faraday Society,* v. 43, Nov.-Dec. 1947, p. 679-697.

Method which was developed for measurement of electrode potentials of metals and alloys during surface rubbing of the immersed specimens. Comparison of potentials obtained with and without rubbing permits conclusions to be made about the tendency of the metals to form protective films. The potentials of 22 metals were measured in 0.1 *N* HNO_3, 0.1 *N* NaOH, and 3% NaCl solutions. Some suggestions about the nature of irreversible potentials of pure metals and solid solutions. In Part II, electrode potentials of the following systems were measured in the same solutions as above: Al with Cu, Zn, Mg, Li, Si; Zn with Al, Cu, Ag, Au; Mg with Al, Zn, Cd, Tl, Sn, Pb; Cu with Al, Zn, Ni, Mn, Ag, Be, Cd, Sn. Results are classified into groups according to the relationship between the potential of the solid solution and its composition. No relationship was found between the potential of the component and its effect on the potential of the solid solution. 25 ref.

6a-39. Protection for the "Mothball Fleet". *Inco,* v. 22, Spring 1948, p. 14-15, 28.

Methods used to keep U. S. Navy inactive vessels free of corrosion, by means of "cocoon" coverings and dehumidifying chemicals and systems.

6a-40. Nitric Acid. *Chemical Engineering,* v. 55, April 1948, p. 219-220.

Part III of a symposium in which construction materials are evaluated for nitric acid services. Worthite by E. T. Collinsworth, Jr.; Nickel, Nickel Alloys by W. Z. Friend; and Protective Coatings. Refers to plastic materials.

6a-41. Les Journées de Corrosion d'Octobre 1947. (Present Tendencies in Research on Corrosion.) Paul Lacombe. *Métaux & Corrosion,* v. 22, Nov.-Dec. 1947, p. 181-184.

New methods for protection against corrosion and for corrosion testing described at International Conference on Corrosion, Paris, Oct. 6-10, 1947.

6a-42. Les Aspects Théoriques de la Corrosion et de l'Oxydation. (Theoretical Aspects of Corrosion and Oxidation.) U. R. Evans. *Métaux & Corrosion,* v. 22, Nov.-Dec. 1947, p. 184-191; discussion, p. 191.

A theoretical development based on Wagner's equation. 29 ref.

6a-43. Mécanisme des Inhibiteurs de Corrosion. (Mechanism of Action of Corrosion Inhibitors.) Herbert H. Uhlig. *Métaux & Corrosion,* v. 22, Nov.-Dec. 1947, p. 204-210.

Fundamental principles. 33 ref.

6a-44. Corrosion Tests of Heater-Tube Materials for Acid Concentration Service. H. F. Brown. *Oil and Gas Journal,* v. 46, April 29, 1948, p. 134-137, 149.

Results of tests on a variety of materials in a laboratory concentrator for H_2SO_4. Materials evaluated were: cast 12-14% Si iron; Si-Ni alloy; Fe-Mo-Ni alloy; glass-coated carbon steel; silver and silver-coated steel; and tantalum. No completely satisfactory materials were found.

6a-45. Fluorine Corrosion. W. R. Myers, and W. B. DeLong. *Chemical Engineering Progress* (Transactions Section), v. 44, May 1948, p. 359-362.

First section deals with corrosion of a number of metals and alloys by hydrogen fluoride and by hydrogen fluoride-steam mixtures at elevated temperatures; second section gives

results of an investigation on behavior of steel parts anodically charged in an electrolyte of $KHF_2 \cdot HF$ at 90° C. 11 ref.

6a-46. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, May 1948, p. 95A-96A.

Importance of design of equipment in preventing and minimizing corrosion and costs of its prevention.

6a-47. Cathodic Protection of Buried Metallic Structures Against Corrosion. *Journal of the American Water Works Association,* v. 40, May 1948, p. 485-488.

Bulletin No. 1 of a series to be prepared by the Correlating Committee on Cathodic Protection.

6a-48. Principles of Cathodic Protection Design. L. P. Sudrabin and Frank P. Macdonald. *Journal of the American Water Works Association,* v. 40, May 1948, p. 489-494.

Basic principles, general design considerations, selection of equipment, and design comparisons. (Presented at joint meeting of Cuban and Florida Sections American Waterworks Assoc., St. Petersburg, Fla., Nov. 20, 1947.)

6a-49. Sulphuric Acid Versus Construction Materials. *Chemical Engineering,* v. 55, May 1948, p. 235-236, 238, 240, 242, 244.

Part I of a symposium in which typical materials of construction are evaluated for services involving sulphuric acid. Includes the following brief articles: Rubber Linings, by O. S. True; Cast Iron and Steel, by Albert W. Spitz; Worthite, by E. T. Collinsworth; Hastelloy, by C. G. Chisholm; and Stainless Steel, by W. G. Renshaw.

6a-50. Electropotentials in Growing Halide and Oxide Layers on Metals. Andrew Dravnieks and Hugh J. McDonald. *Journal of the Electrochemical Society,* v. 93, May 1948, p. 177-190.

Electropotentials can be obtained experimentally by means of an electrode probe; the transference numbers can then be calculated. The method was tested on silver and lead bromide and chloride and on cuprous iodide and oxide scales, and values in agreement with those found by other methods were obtained. The oxides on Fe, stainless steel, Ni, Al, Zn, Mo, and W were investigated and found to be predominately electronic conductors; however, there is some doubt in the case of W. 32 ref. (Prepared for delivery at Columbus, Ohio, meeting, of the Society, April 14 to 17, 1948.)

6a-51. Peculiarities of Reactions of Certain Organic Acids With Industrial Metals. (In Russian.) V. D. Yakhontov. *Zhurnal Obshchei Xhimii.* (Journal of General Chemistry), v. 17 (79), Nov 1947 p. 2054-2057.

Reactions of Mg, Zn, Al and its alloys, Pb, Cu, and a carbon steel with formic, acetic, oxalic, and maleic acids.

6a-52. Design of Exhaust Systems; Handling Corrosion Fumes and Gases. F. H. Stebbins. *Sheet Metal Worker,* v. 39, May 1948, p. 55-56, 105.

Qualitative resistance to corrosion by various acids of various metals, alloys, and other materials.

6a-53. Report of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys. *American Society for Testing Materials, Preprint* No. 9, 1948, 25 pages.

Includes "Apparatus and Factors in Salt Fog Testing", by V. M. Darsey and W. R. Cavanagh; and "Report of Subcommittee VIII on Galvanic and Electrolytic Corrosion. Stainless Steels Coupled with Other Metals—Five Years Exposure".

6a-54. Alloying Steels for Corrosion Resistance to Gas-Condensate Fluids. Part I. C. K. Eilerts, Faye Green, F. G. Archer, Betty Hanna, and L. M. Burman. *Corrosion,* v. 4, June 1948, p.245-263.

Results of tests made by Bureau of Mines using aqueous solutions of carbonic acid, propionic acid, and phenol maintained at 130° F., in determining relative resistance to corrosion of carbon steels, Cr steels, Ni steels, Cr-Ni steels, Cu-Ni steels, and Cu-Ni alloys. 9%-Ni steel was found to have relatively high resistance to corrosion. Cr-Ni steels and Cu-Ni alloys exhibited good resistance. (To be continued.) (Presented at Annual Meeting, N.A.C.E., Chicago, April 7-10, 1947.)

6a-55. Cathodic Protection of Casings in Loudon Pool. S. P. Ewing and J. F. Bayhi. *Corrosion,* v. 4, June 1948, p. 264-286.

Results of investigation indicate that casings approximately 1500 ft. long can be protected by a current of 1.0 to 1.5 amp. (Presented at Annual Meeting, N.A.C.E., St. Louis, Mo., April 5-8, 1948.)

6a-56. Corrosion of Underground Steam Line Supports. Leo F. Collins, F. J. Schlachter, and G. D. Winans. *Heating and Ventilating,* v. 45, June 1948, p. 83-85.

Results of corrosion tests of 16 metals at seven different sites along the 40 miles of underground steam lines.

6a-57. Rust Prevention in Products Pipe Lines. E. W. Unruh and F. M. Watkins. *Oil and Gas Journal,* v. 47, June 17, 1948, p. 63-64, 67, 69.

Properties and uses of Sinclair RD-119, a new rust inhibitor recently developed and tested on a commercial basis.

6a-58. Uber die Abhangigkeit der atmosphärischen Korrosion der Metalle von den schwefelhaltigen Verunreinigungen der Luft. (Dependence of the Atmospheric Corrosion of Metals on the Sulphur-Containing Impurities in the Air.) Gerhard Schikorr. *Metalloberfläche,* v. 1, May 1947, p. 115-116.

Al, Pb, Zn, Cu, Ni, Mg, and Fe were found to corrode at rates dependent on the sulphur contamination of the air.

6a-59. Station Design and Material Composition as Factors in Boiler Corrosion. R. B. Donworth. *American Society for Testing Materials, Preprint* No. 106, 1948, 8 pages.

Physical relationship of the materials and the influence of design on both corrosion and erosion and the subsequent carrying of the products into the boiler.

6a-60. An Investigation of Fretting Corrosion Under Several Conditions of Oxidation. B. W. Sakmann and B. G. Rightmire. *National Advisory Committee for Aeronautics Technical Note* No. 1492, June 1948, 57 pages.

Results of tests on fundamental mechanism of the phenomenon observed at contact surfaces subject to vibration, for various materials, including steel, phosphor-bronze, tin, aluminum, aluminum alloys, lead, lead-plated steel, and chromium steel, in air, in vacuum, in oxygen, and in helium under identical conditions of load and slip.

6a-61. Sulphuric Acid Versus Construction Materials. *Chemical Engineering,* v. 55, June 1948, p. 223-224, 226, 228, 230, 232.

Part II of a symposium in which typical materials of construction are evaluated for services involving sulphuric acid. Precious Metals, by E. F. Rosenblatt; Durimet, by Walter A. Luce; and Carbon, Graphite, by W. W. Palmquist.

6a-62. Corrosion Costs in the Petroleum Industry. F. A. Rohrman. *Petroleum Engineer*, v. 19, June 1948, p. 115-116, 118, 120.

Factors in corrosion control and economic aspects.

6a-63. Stress-Corrosion and Corrective Measures. Mars G. Fontana. *Metal Progress,* v. 53, June 1948, p. 838-840.

In last of a four-part article on "The Eight Forms of Corrosion". One of the most puzzling and hard-to-handle manifestations of corrosion.

6a-64. Stress Corrosion. J. C. Chaston. *Nature,* v. 161, June 5, 1948, p. 891-892.

Possible mechanisms which cause season-cracking in brass and similar alloys.

6a-65. Electronic Tracing of Polarization Curves. Part I. Instrumentation. Glenn A. Marsh and Hugh J. McDonald. *Corrosion and Material Protection,* v. 5, May-June 1948, p. 11-14. (*Journal of Corrosion,* p. 1-4.)

Circuit of an instrument designed to permit easy following of six polarization variables of interest in corrosion research.

6a-66. Practical Use of Chromate Inhibitors in Engine Cooling Systems. D. D. Wright. *Canadian Chemistry and Process Industries,* v. 32, June 1948, p. 533-535.

Control of corrosion in the cooling-water system of compressors. How chromate-treated steam condensate removes all danger of scale formation, removes scale already present in the engine, and increases the expected life of piping employed.

6a-67. Dry Corrosion Investigated at Pittsburgh Conference. *Chemical and Engineering News,* v. 26, June 28, 1948, p. 1901.

Proceedings of International Conference on Surface Reactions, Mellon Institute, June 6 to 11, 1948. Among those present were representatives of laboratories in England, France, Germany, Holland, Sweden, and Switzerland. Much of the discussion centered about the mechanism of dry corrosion.

6a-68. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, July 1948, p. 73A-74A.

Materials of construction for making and handling acetic acid and actual plant problems.

6a-69. Motor Oils—1948. J. C. Geniesse and J. F. McGrogan. *Oil and Gas Journal,* v. 47, July 8, 1948, p. 67-68, 71-73.

Methods for evaluating motor oils, and performance of rust inhibitors and detergents. Effects of these ingredients on engine parts.

6a-70. The Resistance of Alloys to Corrosion During the Processing of Some Foods. J. F. Mason, Jr. *Corrosion,* v. 4, July 1948, p. 305-320.

Results of corrosion tests in the handling and processing of food-

stuffs. Only material not previously published by International Nickel Co. Data for a variety of metals and alloys.

6a-71. Alloying Steels for Corrosion Resistance to Gas-Condensate Fluids. Part 2. C. K. Eilerts, Faye Greene, F. G. Archer, Betty Hanna, and L. M. Burman. *Corrosion,* v. 4, July 1948, p. 321-356; discussion, p. 356-357.

Data for carbon steels, Cr steels, Ni steels, Cr-Ni steels, Cu-Ni steels, other Cu-Ni alloys, and plated steels. Effect of sodium chloride on rate of corrosion of alloy steels; composition of metals and tendency toward wetting by the condensate; and susceptibility to corrosive attack by well-treating acid. 14 ref.

6a-72. Corrosion by Molten Materials. Part I. F. R. Morral. *Wire and Wire Products,* v. 23, June 1948, p. 484-489.

A compilation, in tabular form, of data from the literature. 31 ref. (To be continued).

6a-73. The Work of the Corrosion Committee of the British Iron and Steel Research Association. *Paint Technology,* v. 150, June 1948, p. 232-233.

Remarks by T. M. Herbert, by J. C. Hudson, and general discussion.

6a-74. Verhalten von metallischen Werkstoffen Gegenuber sehr verdunnten, wässrigen Lösungen. (Behavior of Metals in Very Dilute Aqueous Solutions.) L. W. Haase. *Archiv fur Metallkunde,* v. 1, June 1947, p. 259-264.

The factors responsible for waterworks corrosion. Deals with both ferrous and nonferrous metals and alloys.

6a-75. Uber die lösungsvermindernde Wirkung der Nikotinsäure (β-Pyridinkarbonsäure) auf Metalle. (The Inhibiting Effect of Nicotinic Acid (β-Pyridine Carbonic Acid), on the Solubility of Metals.) L. Hertelendi. *Archiv fur Metallkunde,* v. 1, June 1947, p. 275-278.

Nicotinic acid was found to decrease the rate of solution of metals in mineral acids. The inhibiting effect varies with different solutions and different metals, and no protective film is formed. 11 ref.

6a-76. Metals for Use with Highly Corrosive Media. *Materials & Methods,* v. 28, July 1948, p. 87, 89.

Chemicals to which aluminum; brass; bronze; duriron; Hastelloys A, B and C; iron; lead; monel; nickel; phosphor bronze; stainless steels 303 and 316; ordinary steel; and tantalum are "impervious to" and "highly resistant to".

6a-77. Corrosion Can Be Controlled in Refrigeration Systems. Joseph I. Montel. *Refrigerating Engineering,* v. 56, July 1948, p. 35-38.

How it can be done by use of corrosion inhibitors.

6a-78. Corrosion by Molten Materials. Part II. (Concluded.) F. R. Morral. *Wire and Wire Products,* v. 23, July 1948, p. 571-579.

Data on corrosion in molten salts and in salt mixtures.

6a-79. Sulphuric Acid Versus Construction Materials. *Chemical Engineering,* v. 55, July 1948, p. 227-228, 230, 232, 234, 236.

Part III of a symposium in which typical materials of construction are evaluated for services involving sulphuric acid. High-Silicon Irons, Walter A. Luce; Silicones, J. A. McHard; Tantalum, Leonard R. Scribner; and Haveg, E. P. Mampe.

6a-80. A Method of Electrically Bonding High Resistance Pipe Couplings Without Excavation. H. S. Riddle and H. S. Harris, *Gas Age,* v. 102, July 8, 1948, p. 17-18, 56-57.

A remedial measure for protecting subsurface pipe-lines against electrolysis by flash-brazing copper wire to the pipe couplings from surface of the ground, utilizing an electric welding machine and making physical contact through auger-holes.

6a-81. Appliance Corrosion Under Attack. H. A. Pray, R. S. Peoples, and R. S. Dalrymple. *American Gas Association Monthly,* v. 30, July-Aug. 1948, p. 19-23, 59-60.

A.G.A.-sponsored project at Battelle Memorial Institute for development of apparatus and procedures to study conditions which exist in central gas-heating equipment.

6a-82. Electrochemical Study of the Mechanism of Metal Corrosion in Ethylene Glycol Solutions. (In Russian.) N. D. Tomashov and M. A. Timonova. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, Feb. 1948, p. 221-231.

Anodic and cathodic polarization curves for Cu, Fe, Al in contact with the above solution. From these, conclusions are drawn concerning the mechanisms involved and the relationship of certain controlling factors to the corrosion which takes place.

6a-83. Le mécanisme de la protection cathodique. (The Mechanism of Cathodic Protection.) R. B. Mears. *Métaux & Corrosion,* v. 23, March-April 1948, p. 50-56.

Mechanism of cathodic protection; its criteria and applications. 13 ref.

6a-84. La technique de la protection cathodique. (The Technique of Cathodic Protection.) R. de Brouwer. *Métaux & Corrosion,* v. 23, March-April 1948, p. 57-70.

The different systems employed for cathodic protection of pipe lines.

6a-85. The Work of the Chemical Research Laboratory. *Engineering,* v. 166, July 9, 1948, p. 29.

Work of above laboratory of the British Government's Dept. of Scientific and Industrial Research. It is divided into five main branches including corrosion of metals.

6a-86. Metal Oxide Films at Elevated Temperatures. J. W. Hickman. *Iron Age,* v. 162, Aug. 12, 1948, p. 90-94. Aug. 19, 1948, p. 90-94.

Investigation of the structures of thin oxide films in various metals and alloys, conducted for the purpose of evaluating surface stability characteristics, Principles associated with the study of surface structures and the experimental procedure followed in the course of this reflection electron diffraction study.

6a-87. Marine Corrosion Testing. Frank N. Speller. *Blast Furnace and Steel Plant,* v. 36, Aug. 1948, p. 950-953.

Review of duscussions of marine corrosion testing.

6a-88. Die Ursache der Spannungskorrosionsempfindlichkeit homogener Legierungen. (The Cause of Stress Corrosion Sensitivity of Homogeneous Alloys.) Ludwig Graf. *Metallforschung,* v. 2, July-Aug. 1947, p. 193-207.

Effect of the degree of purity of deoxidizing soluble additions, the gravity ratio, the chemical and electro-chemical effect on stress corrosion. 34 ref.

6a-89. Zur Spannungskorrosion heterogener Legierungen. (Stress Corrosion of Heterogeneous Alloys.) Ludwig Graf. *Metallforschung,* v. 2, July-Aug. 1947, p. 207-212.

Relationship of causes of stress corrosion in homogeneous and heterogeneous alloys, difference between grain boundary and structural heterogeneity, and the reactions in different aluminum, copper, and gold alloys. 13 ref.

6a-90. Corrosion Studies. Albert L. Kimmel. *Florida Engineering and Industrial Experiment Station College of Engineering,* University of Florida, (Gainesville), Bulletin no. 17, Sept. 1947, 42 pages.

Mechanical, chemical, and electrical methods for mitigation of corrosion. Engineering data relative to the installation of cathodic protection systems in water tanks.

6a-91. Fluorine Corrosion: (A) High-Temperature Attack on Metals by Fluorine and Hydrogen Fluoride; and (B) Behavior of Insulated Steel Parts in Fluorine Cells. W. R. Myers and W. B. DeLong. *U. S. Atomic Energy Commission,* MDDC-1465, 1947, 19 pages.

The corrosion of a number of metals and alloys by fluorine at elevated temperatures. The data were obtained by exposing samples to fluorine in an electrically heated furnace equipped with a monel tube. Results of a study of the attack on a number of metals and alloys by HF and by HF-steam in equimolecular quantities. Results of an investigation on the behavior of steel parts anodically charged in an electrolyte of $KHF_2 \cdot HF$ at 90° C.

6a-92. Progress Being Made in Fight Against Corrosion Losses of Metals. William Mann. *Materials & Methods,* v. 28, Aug. 1948, p. 51-55.

Recent advances in processes and methods in combating corrosion.

6a-93. Corrosion Prevention in Processing Sour Crudes. E. Q. Camp. *Corrosion,* v. 4, Aug. 1948, p. 371-398.

Problems encountered. Flow diagram for processing sour crudes. Corrosion aspects of various process units. 29 ref.

6a-94. Corrosion in Vertical Turbine Pumps. T. E. Larson, *Corrosion,* v. 4, Aug. 1948, p. 412-420.

Various types of corrosion in water pumping systems.

6a-95. The Electrochemical Theory of the Solution of Metals in Acids. IV. (In Russian.) Ya. V. Durdin. *Zhurnal Obshchei Khimii.* (Journal of General Chemistry), v. 18 (80), March 1948, p. 345-363.

Details of a theoretical, mathematical analysis of the cathodic and anodic processes and their relative influences on the interaction of metals with acids. 17 ref.

6a-96. Les etats de surface et les propriétés physicochimiques réeles des métaux. (The Surface States and the True Physicochemical Properties of Metals.) Georges Chaudron. *Revue de Métallurgie,* v. 45, March-April 1948. p. 61-67.

The rate of attack of corrosive media on metals depends primarily on the nature of the oxide film and secondarily on the structure of the upper layer of metal. However, investigations showed that other factors are involved (effect of which have not as yet been fully established) which may be of even greater importance in the physicochemical behavior of metals. 11 ref.

6a-97. The Mechanism of the Formation of Films on Metals. U. R. Evans. *Corrosion and Material Protection,* v. 5, July-Aug. 1948, p. 15-19.

In 1943, Vernon discussed the laws governing the formation of oxide films, or other layers, on a metallic surface, and concluded that good experimental evidence exists for four growth-laws; parabolic, rectilinear, logarithmic, and asymptotic. The present author has shown that, by considering the alternative manners in which films might be expected to grow, these four laws are readily deducted. The arguments are condensed into a single, short and relatively nonmathematical statement. 35 ref.

6a-98. Petroleum Rust Preventives. Albert E. Hickel. *Petroleum Refiner,* v. 27, Aug. 1948, p. 94-96.

Various grades available now for practical application; condition and length of service are big factors to consider in corrosion of metals.

6a-99. Causes of Steel Corrosion. Ivor Richards. *Organic Finishing,* v. 9, Aug. 1948, p. 41-46.

A textbook-type discussion of the theory of corrosion and factors which cause it.

6a-100. Inhibiting Corrosion in Packaged Goods. *Electroplating,* v. 1, Aug. 1948, p. 533-534.

A newly-patented method of preventing corrosion during transport and storage.

6a-101. Preventing Galvanic Corrosion. H. Seymour. *Mining Magazine,* v. 79, Aug. 1948, p. 84-87.

Cathodic protection of piping.

6a-102. Surface Reactions. *Metal Industry,* v. 73, Aug. 6, 1948, p. 106.

Discusses various recent papers on oxide films on metals and alloys.

6a-103. Temperature and Humidity Factors in the Corrosion of Metals in a Sulphur Dioxide Atmosphere. (In Russian.) O. V. Zarubina and M. L. Turich. *Zhurnal Prikladnoi Khimii.* (Journal of Applied Chemistry), v. 21, April 1948, p. 362-371.

In the temperature range between 15 and 40° C., at any value of the relative humidity, the main factor in the corrosion of metal surfaces in an SO_2 atmosphere was found to be the temperature. The maximum corrosion was observed from 20 to 25° C., at a relative humidity of 80% or more. Metals or alloys tested were soft iron, cast iron, aluminum, sheet iron, nickel steel, copper, and brass.

6a-104. Considérations sur la passivité des métaux. (Theories Concerning the Passivity of Metals.) R. Piontelli. *Métaux & Corrosion,* v. 23, May 1948, p. 124-135; discussion, p. 134.

Results of a theoretical study of the above, including effects of a series of pertinent factors. Phenomena should be studied from thermodynamic, kinetic, and structural points of view.

6a-105. Atmospheric Corrosion Testing Site. Arba H. Thomas. *Corrosion,* v. 4, Sept. 1948, p. 456 and special section, p. 1.

Five-acre outdoor laboratory of Armco Steel Corp., Middletown, Ohio.

6a-106. Management Information on Cathodic Protection of Buried Metallic Structures Against Corrosion. *Corrosion,* v. 4, Sept. 1948, special section, p. 3-5.

Bulletin I prepared by the Correlating Committee on Cathodic Protection, National Association of Corrosion Engineers.

6a-107. Application of Electron Diffraction Techniques to the Study of Corrosion Processes. E. A. Gulbransen. *Corrosion,* v. 4, Sept. 1948, p. 445-455.

Pertains primarily to the study of the dry-oxidation reaction. Discusses particularly the corrosion of iron and of an alloy of Fe, Ni, and Cr. Principles and operation of the electron microscope and methods of its use for above type of problem.

6a-108. Oxydation sélective superficielle d'un alliage et influence de la structure du métal sur la marche de l'oxydation seche. (Selective Surface Oxidation of an Alloy and the Influence of Metal Structure on the Course of Dry Oxidation.) Pierre Chevenard and Xavier Waché. *Revue de Métallurgie,* v. 45, May-June 1948, p. 121-128.

Details of an experimental investigation of the above for a 5.2%-Cr nickel alloy; for a 2.4%-Al, 2.4%-Mn nickel alloy; for a 49.5%-Ni ferronickel; and for an 18-8 stainless steel. A thermomagnetic method and the thermobalance were used to follow the course of oxidation. It was found that during dry oxidation, the diffusion of metal into the surface layer is blocked by an oxide film. Physical and chemical transformations in this film take place during the first hour of heating.

6a-109. Prevention of Corrosion in Refinery Heat-Exchanger Equipment. M. A. Furth. *Proceedings, American Petroleum Institute,* v. 28M (III), 1948, p. 26-32; discussion, p. 32-34.

Previously abstracted from *Petro-*

leum Processing, v. 3, June 1948, p. 549, 551-552, 554-555. See item 6b-63, 1948.

6a-110. Industrial Alcohol Versus Construction Materials. *Chemical Engineering,* v. 55, Sept. 1948, p. 247-248.

Part I of a symposium in which a representative group of construction materials are evaluated for services involving industrial alcohol. Introduction, by William C. Moore; and Chemical Stoneware, by F. E. Herstein.

6a-111. Protecting Cooling Systems Subject to Electrolysis. E. W. Balis and H. A. Liebhafsky. *General Electric Review,* v. 51, Sept. 1948, p. 40-45.

The larger electronic tubes such as power rectifiers must be cooled to remove the heat generated during operation. When a potential difference exists across insulated sections of liquid cooling systems, the metal at the anodic end of an insulated section is liable to electrolytic attack. One preventive measure is to connect to the anodic piping a metallic target that projects into the insulated section and collects most of the current.

6a-112. Handling Sulfuric Acid Sludges. E. L. Hildebrand. *Oil and Gas Journal,* v. 47, Sept. 30, 1948, p. 68-69, 90.

Corrosion problems involved, especially in connection with its use in the petroleum industry.

6a-113. Corrosion of Metals with Oxygen Depolarization. *Light Metals,* v. 11, Sept. 1948, p. 503-509. (Concluded.)

Final installment of condensed translation of Russian book by N. D. Tomashoff (Academy of Sciences of the U.S.S.R.). Application of polarization curves to the study of corrosion of metals.

6a-114. Selection of Valve Material for Petroleum Applications. H. O. Teeple. *Proceedings, American Petroleum Institute,* v. 28M (III), 1948, p. 35-41; discussion, p. 41-43.

Available materials of construction for valves from the standpoint of applications in petroleum processes. Corrosives considered include H_2SO_4, HCl, HF, NaOH, NH_3, high-temperature sulphur, and others. Materials considered include steel and cast iron and the highly alloyed materials.

6a-115. Exposé de quelques méthodes ayant pour objet d'étudier le comportement d'alliages en présence d'eau de mer en mouvement rapide. (Description of Several Methods for Study of the Behavior of Alloys in the Presence of Salt Water in Rapid Motion.) F. L. LaQue and W. C. Stewart. *Métaux & Corrosion,* v. 23, June 1948, p. 147-164.

Apparatus, procedure and results obtained during research in the U. S. at the U. S. Navy's research center at Annapolis, Md., and at Dow Chemical Co.'s Kure Beach marine-exposure station.

6a-116. A Method of Testing the Corrosion Resistance of Gas Appliances. H. A. Pray, R. S. Peoples, and R. S. Dalrymple. *Gas Times,* v. 56, Sept. 10, 1948, p. 328-330.

Details of apparatus and procedure developed at Battelle Memorial Institute under sponsorship of American Gas Association. Effects of sulphur content on corrosion of S.A.E. 1010 sheet steel exposed to flue gas under cyclic conditions.

6a-117. Performance of Steam Condensers Aboard U. S. Naval Vessels. H. E. Bethon. *Corrosion,* v. 4, Oct. 1948, p. 457-462.

Based on wartime experience, the author summarized recommendations for materials and design. Continued use of 70%-Cu, 30%-Ni tubes and tube sheets and of Monel water boxes; use of electronically controlled tube expanders for rolling the tubes into the tube sheet; and consideration of the pros and cons of continuing the use of zinc or mild-steel plates when similar materials are used in the hydraulic circuit.

6a-118. The NDHA Corrosion Tester; Why and How It's Used. Leo F. Collins. *Heating, Piping & Air Conditioning,* v. 20, Oct. 1948, p. 77-80.

The need for studying corrosion rates and the development, features, performance, and uses of the NDHA corrosion tester, which has demonstrated its reliability as a measuring device. The tester and method of installation in pipe-line and tank systems of various sizes and shapes. It consists of three helical wire coils supported by a frame and electrically insulated from each other and the frame. The coils are specimens whose weight losses are determined.

6a-119. Corrosion Resistant Materials in Brass and Copper Pickling. *Iron Age,* v. 162, Oct. 7, 1948, p. 100-101.

Four plant corrosion tests for pickling of brass and copper and four for bright pickling of brass. Using each test, corrosion rates are given for a series of corrosion-resistant metals and alloys.

6a-120. Corrosion of Metals Research; Progress Report of the Chemical Research Laboratory. *Metallurgia,* v. 38, Sept. 1948, p. 282-285.

Extracts from recently published report record progress made in the fields of organic inhibitors and microbiological corrosion.

6a-121. Materiaalkeuze en corrosiebestrijding in de chemische industrie. (Selection of Materials and the Corrosion Resistance for Chemical Industry.) H. C. J. de Decker. *Metalen,* v. 3, Sept. 1948, p. 1-11.

Choice of materials and the prevention of corrosion in the chemical industry.

6a-122. The Zone of Metal Phase Consumption in Gas-Metal Reactions. Andrew Dravnieks and Hugh J. McDonald. *Journal of the Electrochemical Society,* v. 94, Oct. 1948, p. 139-151.

Shows, by an analysis of the scale-growth process, that the scale formed in the reaction between gas and metal must consist of at least two layers formed under completely different conditions. A third layer may be formed by some secondary process, for example, recrystallization. The concept of a uniform process of scale growth is, therefore, an oversimplification and fundamentally incorrect. Protective-film formation on aluminum and the accelerated growth of oxide films on metals at the beginning of oxidation.

6a-123. Corrosion Tests in Organic Sulfations and Sulfonations. W. Z. Friend. *Journal of the American Oil Chemists' Society,* v. 25, Oct. 1948, p. 353-358.

Results of some plant and laboratory corrosion tests in organic sulphations and sulphonations under a variety of operating conditions as an indication of the metals and alloys which should be considered for the construction of processing equipment.

6a-124. Cathodic Protection of Buried Metallic Structures Against Corrosion. *American Railway Engineering Association, Bulletin,* v. 50, Sept.-Oct. 1948, p. 147-150.

First of a series of four bulletins prepared by the correlating committee on cathodic protection.

6a-125. The Importance of Controlled Humidity in Long Time Preservation. George C. Wells. *Corrosion and Material Protection,* v. 5, Sept.-Oct. 1948, p. 4-8.

Dehumidification systems used by the Navy in preservation of the "mothball fleet." Illustrations show comparative appearances of metals, fabrics, and other materials, after three years exposure to 30 and 90° humidities. Maintenance of 30° humidity is sufficient to keep most equipment in very good condition.

6a-126. Reactions of Metals and Alloys with Oxygen, Sulphur and Halogens at High Temperatures. Carl Wagner. *Corrosion and Material Protection,* v. 5, Sept.-Oct. 1948, p. 9-12.

Fundamental principles, on the basis of the literature. 43 ref.

6a-127. Industrial Alcohol Versus Construction Materials. *Chemical Engineering,* v. 55, Oct. 1948, p. 235-236, 238, 240, 242, 244, 246, 248, 250, 252.

Part II of a two-part symposium in which a representative group of construction materials are evaluated for services involving industrial alcohol. Includes Stainless Steel, W. G. Renshaw; Aluminum, J. P. Balash and E. D. Verink, Jr.; Lead, Kempton H. Roll; Iron and Steel, A. W. Spitz; Nickel, Nickel Alloys, W. Z. Friend; and Tantalum, Leonard R. Scribner.

6a-128. Transportation and Storage of Strong Nitric Acid. George A. Sands. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1937-1945.

Corrosion tests were made on specimens of stainless steel and aluminum used to make drums, and methods of drum fabrication were investigated; tests with sample drums duplicated actual transportation, storage, and weather-exposure conditions. Necessity for proper heat treatment of stainless steel is indicated.

6a-129. Corrosion of Metals in Red Fuming Nitric Acid and in Mixed Acid. Nathan Kaplan and Rodney J. Andrus. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1946-1947.

A number of metals and alloys were tested. Several stainless steels and Duriron exhibited good resistance to corrosion by concentrated HNO_3; Al alloys were more extensively attacked, Haynes-Stellite alloys and chromium were only slightly corroded, and tin, gold, and tantalum exhibited very good resistance, even at elevated temperatures.

6a-130. The Power Plant. Station Design and Material Composition Factors in Boiler Corrosion. R. B. Donworth. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1236-1239.

Previously abstracted from *American Society for Testing Materials, Preprint* no. 106, 1948. See item 6a-59, 1948.

6a-131. Progres dans l'étude de l'oxydation superficielle des métaux et alliages a des températures élevées. (Progress in the Study of Surface Oxidation of Metals and Alloys at Elevated Temperatures). Earl A. Gulbransen. *Revue de Métallurgie,* v. 45, July 1948, p. 181-204.

The rate of formation of oxide was studied by use of the quartz microbalance. Results of electron-diffraction study at elevated temperatures of the structure of oxide films formed on Fe, Co, Ni, Cr, 13% Cr Fe, and 18-8 stainless steel. (To be continued.)

6a-132. Nouvelles applications de la theorie de l'oxydation des metaux possedant deux oxydes. (New Applications of the Theory of Oxidation of Metals Having Two Oxides.) Gabriel Valensi. *Revue de Métallurgie,* v. 45, July 1948, p. 205-210.

Presents further mathematical development of the theory, proposed by the author in 1936 for dry oxidation of metals having two oxides. Experimental confirmation for the case of copper and its two oxides, CuO and Cu_2O. 16 ref.

6a-133. Contribution a l'étude de la mesure et du mécanisme d'action des inhibiteurs de corrosion. (Study of the Measurement of and the Mechanism of the Action of Corrosion Inhibitors.) Léo Cavallaro. *Métaux & Corrosion,* v. 23, July-Aug. 1948, p. 184-190.

A thorough investigation indicates that the limits of indicator efficiency lie within a wide pH interval. The relationship between the crystal structure and inhibiting power of a series of commonly used inhibitors was determined. 57 ref.

6a-134. The Resistance of Alloys to Corrosion During the Processing of Some Foods. J. F. Mason, Jr. *Metallurgia,* v. 38, Oct. 1948, p. 320-327.

Previously abstracted from *Corrosion,* v. 4, July 1948, p. 305-320. See item 6a-70, 1948.

6a-135. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Nov. 1948, p. 87A-88A.

Problems encountered in contact H_2SO_4-plant equipment.

6a-136. A Simple Test Method for Evaluating Corrosion Inhibitors. J. W. Ryznar and J. Greene. *Corrosion,* v. 4, Nov. 1948, p. 505-515.

A solid cylinder of metal is rotated at constant speed for 24 hours in a water containing the inhibitor being evaluated. Visual examination is the main criterion of the results, but supplementary information is obtained by measurement of the potential of the metal with respect to the water and by analysis of the water for iron.

6a-137. Some European Researches on Passivity. U. R. Evans. *Corrosion,* v. 4, Nov. 1948, p. 545-556.

Critically reviews these researches. 57 ref.

6a-138. Corrosion in the Power Industry. Irwin C. Dietze. *Corrosion,* v. 4, Nov. 1948, p. 566, technical section; p. 1, news section.

Use of plastic paint on condenser tubes and other equipment in contact with sea water.

6a-139. The NDHA Corrosion Tester; How it Performs in Use. Leo F. Collins. *Heating Piping & Air Conditioning,* v. 20, Nov. 1948, p. 83-87.

Typical results obtained in connection with various corrosion problems. Influence of accumulated corrosion products; effects of cold working of metals; reproducibility of results; significance of measured values and their correlation with equipment life; appraisal of corrosion inhibitors; atmospheric corrosion in an underground steam system; corrosivity of salt solutions.

6a-140. The Engine Performance of Lubricants. C. G. Williams. *Institute of Petroleum Review,* v. 2, Oct. 1948, p. 306-316.

Engine deposits and corrosion.

6a-141. Maximum Temperature of Stability of Various Alloys to Oxidizing Atmospheres. Benjamin Lustman. *Materials & Methods,* v. 28, Nov. 1948, p. 97.

6a-142. 13th Chem & Met Report on Materials of Construction. *Chemical Engineering,* v. 55, Nov. 1948, p. 97-128.

For each of 17 common materials used in chemical industry, a concise summary of good, up-to-date practice in the selection of construction materials. Flow sheets show the process for production of each chemical with materials of construction of each piece of equipment identified. Corrosion-resistant materials of construction, giving trade name, manufacturer, composition or description, and most important applications.

6a-143. Corrosion by Sulphates. W. Z. Friend. *Chemical Engineering,* v. 55, Nov. 1948, p. 145-147.

Plant data for number of inorganic sulphates.

6a-144. Nitric Acid Containers. *Chemical Engineering,* v. 55, Nov. 1948, p. 265-266.

M.C.A. finds best materials are stainless Types 304 and 347 and aluminum 3S and 99.6%.

6a-145. What Causes Corrosion of Metals? William H. Lang. *Heating and Ventilating,* v. 45, Nov. 1948, p. 64-66.

Explanations of the various theories that have been advanced, including the findings of F. N. Speller.

6a-146. Punched Cards for Filing Corrosion Test Results. Lorraine R. Voigt. *Corrosion,* v. 4, Dec. 1948, p. 582-589.
Use of Keysort cards for this by International Nickel Co.

6a-147. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 69A-70A.
Corrosion and maintenance of contact sulphuric acid plant and auxiliary equipment.

6a-148. Polar-Type Rust Inhibitors; Theory and Properties. H. R. Baker and W. A. Zisman. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 2338-2347.
The various physical and chemical phenomena which are involved in the adsorption of polar solutes from nonpolar or weakly polar solvents. The mechanism of the rust inhibition is analyzed. Comparison of data obtained for selected polar compounds dissolved in petroleum oils, pure hydrocarbons, chlorinated hydrocarbons, aliphatic diesters, polyalkylene glycol derivatives, and silicone fluids. 30 ref.

6a-149. Corrosion Inhibitors. A. G. Sussex. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 159-164.
The mechanism of inhibition and the use of many of the available inhibitors, giving attention to their use in pickling. Introduction by T. P. Hoar. 28 ref.

6a-150. Tests Show Resistance of Ni-Resist to Sea Water. *Nickel Topics,* v. 1, Nov.-Dec. 1948, p. 2.
Results in comparison with cast iron and bronze.

6a-151. Progres dans l'étude de l'oxydation superficielle des métaux et alliages a des températures élevees. IV. Etude au microscope électronique des pellicules d'oxyde formées sur métaux et alliages aux températures moyennes. (Progress in the Study of the Surface Oxidation of Metals and Alloys at High Temperatures. IV. Electron-Microscopic Study of Oxide Films Formed on the Surface of Metals and Alloys at Intermediate Temperatures.) (Concluded.) Earl A. Gulbransen. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 287-300.
Photomicrographs are compared with electron-diffraction patterns for a variety of ferrous and nonferrous metals and alloys. Mechanisms of oxidation. 48 ref.

6a-152. A Simple Form of Accelerated Atmospheric-Corrosion Test. R. St. J. Preston. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 286-294.
A test in which specimens are subjected to corrosion in a warm humid atmosphere containing SO_2. Effects of temperature and concentration of SO_2 on rates of corrosion of bare and phosphated steel, with and without paint. A method of determining the spread of rust by measurement of light reflection and the effects of artificially damaging paint films.

6a-153. The Use of Inhibitors for Controlling Metal Corrosion. Part I. General Principles. G. T. Colegate. *Metallurgia,* v. 39, Nov. 1948, p. 18-20.
Types of corrosion which may occur and the various inhibitors in use.

6a-154. Corrosion of Metals; The Influence of Micro-Organisms. T. Howard Rogers. *Metal Industry,* v. 73, Nov. 19, 1948, p. 403-405; Nov. 26, 1948, p. 432-433. Translated from paper contributed to Les Journées sur la Corrosion des Métaux, Paris, Oct. 1947.
Some of the ways in which corrosion is caused by the influence of bacterial action. 26 ref.

6a-155. Summary of Work on Corrosion by A.S.T.M. Committees. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 212-224.

6a-156. The Mechanism of Oxidation and Tarnishing. U. R. Evans. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 547-570; discussion, p. 570-572.
Previously abstracted from preprint. See item 6-49, 1947.

6a-157. The Kinetics of Oxide Film Formation on Metals and Alloys. Earl A. Gulbransen. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 573-602; discussion, p. 603-604.
Previously abstracted from preprint. See item 6-180, 1947.

6a-158. An Electron Diffraction Study of Oxide Films Formed on High Temperature Oxidation Resistant Alloys. J. W. Hickman and E. A. Gulbransen. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 605-620; discussion, p. 621-622.
Previously abstracted from preprint. See item 6-179, 1947.

6a-159. The Oxidation of Metals. W. E. Campbell and U. B. Thomas. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 623-639; discussion, p. 639-640.
Previously abstracted from preprint. See item 6-82, 1947.

6a-160. Corrosion and Oxidation Experiences in High Pressure and High Temperature Steam Service. Paul M. Brister and J. B. Romer. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 655-678; discussion, 678-680.

Previously abstracted from preprint. See item 6-80, 1947.

6a-161. Corrosion in the Tropics. K. G. Compton. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 705-713; discussion, p. 714.

Previously abstracted from preprint. See item 6-244, 1947.

6a-162. Uber das thermische Verhalten von Natriumverbindungen, im besonderen von Natriumoxyd und Natriumsulfid und ihre Reaktionen mit Metallen. (The Thermal Behavior of Sodium Compounds, Especially of Sodium Monoxide and Sodium Sulphide and Their Reactions With Metals.) E. G. Bunzel and E. J. Kohlmeyer. *Zeitschrift fur anorganische Chemie,* v. 254, Sept. 1947, p. 1-30.

A general but comprehensive study; suitable crucible linings for melting Na-compounds. 33 ref.

6a-163. Die atmosphärische Korrosion metallischer Uberzuege. (Atmospheric Corrosion of Metallic Coatings.) Gerhard Schikorr. *Metalloberfläche,* v. 1, Nov.-Dec. 1947, p. 245-251.

Results of a study made under numerous atmospheric conditions and climates (including oceanic, tropical, and desert airs), and of their corrosive effects on different types of porous and nonporous metallic coatings. 35 ref.

6b—Ferrous

6b-1. Discussion on the Protection of Iron and Steel Against Corrosion. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 349-368.

The Effects of Different Methods of Pretreating Iron and Steel Before Painting, by F. Fancutt (Iron and Steel Institute Special Report No. 31), and The Protection of Iron and Steel by Metallic Coatings, by J. C. Hudson and T. A. Banfield (no. 2 issue, 1946).

6b-2. Stress-Corrosion Cracking of Steels. W. P. Rees. *Engineering,* v. 164, Nov. 21, 1947, p. 489-490. Condensed from "Note on Stress-Corrosion Cracking of Steels in the Presence of Sulphur Compounds", presented at Symposium on Internal Stresses in Metals and Alloys, London, Oct. 15-16, 1947.

Several cases of stress-corrosion cracking upon exposure to media containing sulphur compounds: first, in stainless steel filter wire used in a crude petroleum pipeline; second, in flapper-valve plates of an air compressor; third, on alloy steel cylinders for gas storage.

6b-3. Passivation of Stainless Steel. F. H. Beck. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 32-38.

Results of experimental work indicate that the passive film is a layer of physically adsorbed gas on the metal surface or possibly a physically adsorbed gas layer on a hydrous oxide film formed by the passivating methods. Method used for passivating stainless steel and for corrosion testing; the vacuum-breakdown apparatus. Use of synthetic sea water, repassivation by inert gases, and electron diffraction work.

6b-4. High-Temperature Oxidation. H. M. McCullough. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 38-41.

Procedures and equipment. Results for two types of stainless steel.

6b-5. Utilization of Electrically Insulated Couplings in Corrosion Control. W. F. Levert. *Corrosion,* v. 4, Jan. 1948, p. 24-28.

By this means, it is possible to isolate sections of pipe lines which lie in corrosive soil and apply cathodic protection to them only. Installation of the couplings at intervals along a pipeline breaks up long-line currents, which are very detrimental. (Presented at First Annual Meeting of the South Central Regional Division, N.A.C.E., Houston, Texas, Oct. 26-27, 1947.)

6b-6. Mechanical Design Features of Insulated Couplings. Paul Williams. *Corrosion,* v. 4, Jan. 1948, p. 29-31.

6b-7. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Jan. 1948, p. 89A-90A.

A new malleable, austenitic cast iron; recent developments in the Ni-Resist irons including corrosion test data.

6b-8. Rust Preventives; How They Work, What They Contain. Helen Sellei. *Chemical Industries,* v. 62, Jan. 1948, p. 62-64.

42 references.

6b-9. A Study of Films Isolated From Passive Stainless Steels. E. M. Mahla and N. A. Nielsen. *Journal of the Electrochemical Society,* v. 93, Jan. 1948, p. 1-16.

By use of a bromine-methanol solution, the authors have been able to isolate passive films from electrolytic chromium, ferritic, and austenitic stainless steel, and from the alloys Nichrome V and Inconel. These films were examined by both light microscopy and electron microscopy and by electron diffraction. Structures and compositions identified. (Prepared for delivery at Columbus, Ohio, meeting, April 14-17, 1948.)

6b-10. Inhibition of Steel Corrosion by Sodium Nitrite in Water. Morris Cohen. *Journal of the Electrochemical Society,* v. 93, Jan. 1948, p. 26-39.

Results of a study of the above test methods which included total and alternate immersion, a recirculation apparatus, and potential measurements. The concentration required to inhibit steel corrosion depends on conditions of motion and temperature and the inhibiting effect can be interpreted by solution-potential measurements. The mechanism of inhibition is believed to be the formation of a protective oxide coating. (Prepared for delivery at Columbus, Ohio, meeting, April 14-17, 1948.)

6b-11. Gas Utility Underground Pipe Corrosion Mitigation Practices. A. H. Cramer. *Corrosion,* v. 4, Feb. 1948, p. 72-82.

Methods followed by a gas-distributing company in urban and suburban areas. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6b-12. Soluble Silicates for Corrosion Inhibition in the Oil Industry. Wm. Stericker. *Corrosion,* v. 4, Feb. 1948, p. 83-92.

A number of case histories and conclusions which will serve as guides in the use of silicates elsewhere. (Presented at annual meeting of N.A.C.E., April 7-10, 1947.)

6b-13. Carbon Steel Gives Good Service in Processing Sour Crude Oils. *Petroleum Processing,* v. 3, Feb. 1948, p. 111-113.

Results of inspection of Leonard Refineries' 3000-bbl. per day TCC unit, after a 222-day run on reduced crudes containing about 0.9% sulphur.

6b-14. Maintenance of Stainless Steel Equipment in Refineries. Article 2—Stress and Local Corrosion, Wear and Abrasion, and Cleaning Methods. W. G. Renshaw. *Petroleum Processing,* v. 3, Feb. 1948, p. 155-156, 159-160.

6b-15. What to Look for in Hydraulic Oils—Part VII. Noncorrosive Qualities. Anthony J. Zino, Jr. *American Machinist,* v. 92, Feb. 12, 1948, p. 126-128.

Tests for determining above properties. (Concluded.)

6b-16. Temporary Rust Prevention Treatments. *Agricultural Engineering Record,* Winter 1946-7. p. 180-184.

Various treatments were evaluated by applying a series of commercial products to parallel sections of a steel plow moldboard and exposing it to the weather for several months.

6b-17. Cast-Iron Crucibles; Corrosion by Molten Aluminum. Marcel Bardot. *Iron and Steel,* v. 21, Jan. 1948, p. 23-26. Translated from *Fonderie,* Sept. 1947, p. 798-810.

A summary of a bibliographic study preparatory to further research. Original previously abstracted. See item 6-323, R.M.L., v. 4, 1947. (To be concluded.)

6b-18. Cathodic Protection of Underground Structures. N. P. Peifer. *Corrosion and Material Protection,* v. 5, Jan.-Feb. 1948, p. 6-9.

Use of a relatively new method in which expendable anodes in the form of magnesium ribbon are installed at intervals determined by a survey of earth resistivities.

6b-19. Boiler Feed Pump Corrosion?—Here's What You Can Do About It. H. L. Ross. *Power Generation,* v. 52, Feb. 1948, p. 104, 106, 108.

Causes, remedies, repair procedures, and selection of corrosion resistant materials.

6b-20. A New Concept About the Mechanism of Passivity of Iron in Nitric Acid. R. Parshad and L. C. Verman. *Journal of Chemical Physics,* v. 16, Feb. 1948, p. 154-155.

Experimental evidence which supports the theory of the formation of a hydrogen film between the metal and the oxide film. This is indicated by a sharp rise in potential on insertion of iron in nitric acid, which falls to a much lower potential after about 0.05 sec. This theory explains many phenomena associated with passivity.

6b-21. Cast-Iron Crucibles; Mechanism of Corrosion by Molten Aluminum. (Concluded.) Marcel Bardot. *Iron and Steel,* v. 21, Feb. 1948, p. 49-51. Translated from *Fonderie,* Sept. 1947, p. 798-810.

Previously abstracted from original paper. Concludes literature review. 18 ref. See item 6-323, R.M.L., v. 4, 1947.

6b-22. Corrosion Prevention by Controlled Calcium Carbonate Scale. Sheppard T. Powell, H. E. Bacon, and E. L. Knoedler. *Industrial and Engineering Chemistry,* v. 40, March 1948, p. 453-457.

Corrosion prevention in cooling-tower systems serving steel equipment discussed in an earlier paper. New data for the ionization constants of carbonic acid have been used to recalculate the pH-temperature curves, to bring them up to date. 10 ref.

6b-23. Salt as a Medium of Corrosion of Underground Cables. A. G. Andrews.

Corrosion, v. 4, March 1948, p. 93-98; discussion, p. 98-100.

In areas where grounded d.c. electric railways are operated, some of the return current strays from the rails to underground metallic structures, such as lead-covered telephone cables, causing serious anodic corrosion problems. Protection is usually provided by low-resistance Cu conductors connecting the cables to the negative return of the railway system. This method, where several structures are drained to a common point, has a disadvantage in that various structures have different potential gradients. Typical of this is corrosion in the vicinity of rail switches treated with salt to prevent freezing. Action of stray current then causes NaOH to form around the cables, especially in ducts. Remedy applied is flushing with water when an indicator shows presence of alkali. (Presented at annual meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6b-24. Control of External Corrosion on Plantation Pipe Line. Alan C. Nelson. *Corrosion,* v. 4, March 1948, p. 123-131; discussion, p. 132.

Corrosion control on the above system is divided into four major phases. First is cathodic protection of stations which have suffered numerous leaks in small control lines. Second is cathodic protection of tank bottoms. Third is cathodic protection of the main line with its numerous spots of coating. Fourth, is drainage of strong, fluctuating stray current at a number of electric-railway crossings. (Presented at annual meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6b-25. The Corrosion of Heating Surfaces in Boiler Plants: Further Studies in Deposit Formation. J. R. Rylands and J. R. Jenkinson, *Engineer,* v. 185, Feb. 27, 1948, p. 215-216; discussion, p. 212-213. A condensation.

Relative corrosion of cast iron and steel in air heaters and heat exchangers. Effects of design on corrosion resistance and the cleaning of air heaters and heat exchangers by washing. (Presented at joint meeting of Institutions of Mechanical and Electrical Engineers, London, Feb. 20, 1948.)

6b-26. Nitric Acid Versus Construction Materials. *Chemical Engineering,* v. 55, March 1948, p. 225-226, 228, 230, 232, 234.

Part II of a symposium in which typical materials of construction are evaluated for services involving nitric acid. Carbon and Graphite, by W. M. Gaylord; High-Silicon Iron, by Walter A. Luce; Stainless Steel, by Grant L. Snair, Jr.; and Silicones, by J. A. McHard.

6b-27. Magnesium Anodes for Protecting Water Heaters and Storage Tanks. *Modern Metals,* v. 4, March 1948, p. 32-34.

Research in galvanic corrosion of dissimilar metals as applied to gas hot-water storage heaters, sponsored by Committee on Domestic Gas Research, A.G.A.

6b-28. Corrosion Control in Mid-Continent Oil Production. C. G. Munger. *Brush and Spray,* v. 1, March 1948, p. 1-3.

Previously abstracted from *World Oil.* See item 6-309, R.M.L., v. 3, 1947.

6b-29. Rate of Breakdown and Mechanism of Nitrite Inhibition of Steel Corrosion. Rowena Pyke and Morris Cohen. *Journal of the Electrochemical Society,* v. 93, March 1948, p. 63-78.

The effect of temperature and concentration. The end breakdown product of nitrite was identified and the effect of ratio of cathodic and anodic areas on consumption of nitrite was determined. Rate of consumption was found to be dependent on rate of steel corrosion. A mechanism of reduction of nitrite by adsorption at anodic areas followed by reduction of cathodic hydrogen to give an adherent protective oxide is proposed. (To be presented at meeting of the Society, Columbus, Ohio, April 14-17, 1948.)

6b-30. Corrosion Prevention Begins With Construction. Wm. E. Huddleston. *Petroleum Engineer,* v. 19, March 1948, p. 154, 157, 160.

Recommended procedures for corrosion prevention in pipe-line construction.

6b-31. Effect of Atmospheric Corrosion on Maintenance and Economics of Overhead Line Hardware and Guy Strand—Part I. C. J. Couy. *Corrosion,* v. 4, April 1948, p. 133-140.

Results of an engineering study of the aging or "wearing" characteristics of component materials and of application to the problem of the information so secured. Protection afforded by various metallic coatings; corrosion of the different ferrous alloys used. (Presented at annual meeting, N.A.C.E., Chicago, April 7-10, 1947.)

6b-32. Testing and Selection of Inhibitors for Corrosive High Pressure Condensate Wells. D. A. Shock. *Corrosion,* v. 4, April 1948, p. 179-185.

Reviews methods thus far de-

vised for testing inhibitors and requirements of a satisfactory inhibitor. 23 ref.

6b-33. Steam Turbine Lubrication Problems and Their Solutions. Part 5. "Secondary" or "Acid Condensate Corrosion" Rusting (1). *Petroleum,* v. 11, April 1948, p. 86-87, 98.

Reviews previous articles of series. Mechanism of "secondary" rusting and its prevention; and the oxidation of solvent-refined and "conventionally" refined turbine oils. (To be continued.)

6b-34. Prevention of Drill String Failures in the Permian Basin. Part I. Robert C. McMaster. *World Oil,* v. 127, April 1948, p. 75-80, 82.

Methods followed in research on the problem at Battelle Memorial Institute and conclusions based on observed results.

6b-35. Corrosion Fatigue of Oil Well Equipment. B. B. Morton. *World Oil,* v. 127, April 1948, p. 156, 158, 160, 162, 168.

Fundamental principles of corrosion fatigue and use of nickel alloys and other methods for prevention or minimization. Examples of corrosion fatigue cracks.

6b-36. The Why, How and What of Pipe Line Corrosion. M. E. Parker, Jr. *World Oil,* v. 127, April 1948, p. 184, 186, 188, 190.

Fundamentals and methods of prevention.

6b-37. Recherches sur la Corrosion des Fontes par l'Aluminium et les Alliages Légers au Silicium (Alpax et Hypersiliciés Liquides). (Investigation of Corrosion of Cast Iron Molds by Aluminum and Nonferrous Alloys Containing Silicon. ["Alpax" and Liquid High-Silicon Alloys.]) Paul Bastien and Suzanne Daaschner. *Fonderie,* Dec. 1947, p. 962-964; discussion, p. 964-965.

Ordinary gray cast iron proved most satisfactory with respect to corrosion caused by liquid aluminum. In the case of "Alpax" or high-silicon alloys in the liquid state, the best results were obtained with malleable cast-iron molds.

6b-38. Zinc Anode Protection Installed During Pipe-Line Construction. Otha C. Roddey. *Oil and Gas Journal,* v. 46, April 22, 1948, p. 87-88, 105.

Use of the distributed-anode method and its advantages over other methods.

6b-39. Cathodic Protection of Steel Surfaces in Contact With Water. Leon P. Sudrabin. *Water & Sewage Works,* v. 95, April 1948, p. R109-R121.

Fundamental principles, recommended procedures, and some test results showing effects of different factors. 44 ref.

6b-40. Investigation on Corrosive Matter in Meters. Stanley Jones and J. A. Speers. *Gas Journal,* v. 254, April 7, 1948, p. 40.

Results of a study of the effects of ammonia in the gas on corrosion of tinplate.

6b-41. Cathodic Protection of Steel in Hot Water by Alloys of Magnesium, Zinc, and Aluminum. R. R. Rogers and G. E. Viens. *Canadian Mining and Metallurgical Bulletin,* April 1948, p. 216-224. (*Transactions,* v. 51, 1948.)

The degree of cathodic protection of steel and the anode-corrosion rate were determined for anodes and waters of different compositions at temperatures similar to those in domestic hot-water tanks. 20 different anode materials, 16 of them Mg-Zn-Al alloys, were immersed in different synthetic waters resembling those to be found in various parts of Canada.

6b-42. Behavior of Experimental Zinc-Steel Couples Underground. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 301-313.

An investigation on the behavior of Zn anodes for the protection of iron and steel cathodically in eight diverse soil environments. The experimental unit consisted of a small steel ring to which was connected from one to three Zn cylinders to provide different area ratios of Zn to steel. Corrosion of the steel cathodes was prevented over the test periods of from approximately 3 to 6 years except in one poorly conducting soil and in a very alkaline soil. 13 ref.

6b-43. The Mechanism of Protective Action of Alloying Elements in the Sulphide Corrosion of Iron. P. V. Geld and O. A. Essin. *British Chemical Digest,* v. 2, April 1948, p. 225-227. Translated and condensed from *Journal of Applied Chemistry,* (U.S.S.R.), v. 19, No. 9, 1946.

Diffusion coefficients on basis of protective action of alloying elements, alloying elements with a similar affinity for S as for Fe, and alloying elements with higher affinity for S than for Fe.

6b-44. Hydrogen Attack on Carbon Steels. T. C. Evans. *Mechanical Engineering,* v. 70, May 1948, p. 414-416.

Investigations conducted on plant equipment from which it is concluded that straight low-C steels

containing from 0.10 to 1.35% C are susceptible to hydrogen attack at pressures of 350 psi. and temperatures above approximately 300° C.

6b-45. Effects of Hydrogen Generated by Corrosion of Steel. M. H. Bartz and C. E. Rawlins. *Corrosion,* v. 4, May 1948, p. 187-206.

Various examples of embrittlement of hardened steel parts and blistering of unhardened parts of petroleum-processing equipment. Recommendations for control of hydrogen damage by various methods including use of corrosion-resistant materials and protective coatings; use of steel as free as possible of inhomogeneities; control of H_2S; elimination of corrosion promoters; use of inhibitors; and control of diffusion. 18 ref. (Presented at annual N.A.C.E. meeting, St. Louis, April 5-8, 1948.)

6b-46. Effect of Atmospheric Corrosion on Maintenance and Economics of Overhead Line Hardware and Guy Strand. Part 2. C. J. Couy. *Corrosion,* v. 4, May 1948, p. 207-218.

Considerations of the effect of corrosion decay on structural strength. Effect of different periods of exposure. Charts and equations for determining optimum cross-sectional dimensions and optimum frequencies of inspection. (To be concluded.) (Presented at annual meeting, N.A.C.E. Chicago, April 7-10, 1947.)

6b-47. Salt Water Corrosion of Ships. R. A. Pomfret and L. M. Mosher. *Corrosion,* v. 4, May 1948, p. 227-243.

Fundamental principles which are applied in modern shipbuilding practice to minimize corrosion damage, and consequences when these precautions are not observed. (Presented at annual meeting, N.A.C.E., St. Louis, April 5-8, 1948.)

6b-48. Sur le Mecanisme de l'Oxydation Superficielle du Fer aux Temperatures Elevées. (The Mechanism of Surface Oxidation of Iron at Elevated Temperatures.) J. Benard. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 44, Oct. 1947, p. 266-268.

The speed of growth of an oxide layer depends on two factors—the speed of interaction of iron and oxygen or of iron and oxides already formed; and the speed with which these elements reach the surface. The part played by each of the various oxides of iron in surface oxidation up to 1100° C.

6b-49. Cabos de Aco—Sua Inspeccao. (Steel Cables—Their Inspection.) Jaao Gustavo Haenel. *Boletim da Associacao Brasileira de Metais,* v. 4, Jan. 1948, p. 99-111.

Types of corrosion affecting steel cables. Methods for preventing or minimizing these. 12 ref.

6b-50. Drill-Pipe Failures, Inspection, and Protection in the Permian Basin. W. H. Crenshaw, V. B. Bottoms, C. N. Wallace, and C. R. O'Dell. *Petroleum Engineer.* v. 14, May 1948, p. 277, 278, 280, 282, 284, 286-288; *Oil and Gas Journal,* v. 47, June 10, 1948, p. 97-98, 100-101.

Some of the steps taken by drilling operators during the last two years toward reducing drill-pipe failures. (Presented at meeting of Southwestern District, A.P.I. Division of Production, San Antonio, Texas, April 14-16, 1948.)

6b-51. Effect of the Addition of Amines on the Electrode Potential of Copper in Buffered Acid Solution. Norman Hackerman and J. D. Sudbury. *Journal of the Electrochemical Society,* v. 93, May 1948, p. 191-198.

Extent of inhibitor adsorption on metal surface may be followed by observing the change in the electrode potential of the metal. It is postulated, based on large potential increments at low amine concentrations, that such inhibitors may be effective by decreasing the solution tendency of the most active metal spots. Total effectiveness however, is believed due to a combination of such decrease with cathodic effects and diffusion control. 12 ref. (Prepared for delivery at Columbus, Ohio, meeting of the Society, April 14 to 17, 1948.)

6b-52. La Passivation des Aciers Inoxydables et les Phenomenes d'Adsorption. (Passivation of Stainless Steels and Phenomena of Adsorption). L. Guitton. *Métaux & Corrosion,* v. 23, Feb. 1948, p. 29-33.

Results of experiments indicate that passivation of stainless steel is an adsorption phenomenon, the nature of which depends on the technique of passivation. Activation by preliminary attack of nascent oxygen makes it possible to obtain chemical combination, and produces a surface capable of resisting sulphuric acid corrosion. 14 ref.

6b-53. Corrosion: Its Effect in Boiler Systems. Part I. Robert L. Reed. *Combustion,* v. 19, May 1948, p. 28-33.

The theories of corrosion. The action of oxygen in the boiler system, its removal by mechanical and chemical means, and protection against its action in idle boilers. (To be continued.)

6b-54. Phillips Butane Dehydrogenation Process; Special Plant Investigations. George H. Hanson and Harrison L. Hays. *Chemical Engineering Progress* (Transactions Section), v. 44, June 1948, p. 431-442.

Suitability of various materials of construction for catalyst tubes operating at 1100° F. The original "harps" were made of 27% Cr steel. It was found that both 25-20 and 18-8 Si were equally satisfactory from both chemical and mechanical viewpoints.

6b-55. Cast Nickel-Molybdenum and Nickel-Molybdenum-Chromium Alloys for Severe Corrosion Services. Walter A. Luce. *Chemical Engineering Progress* (Transactions Section), v. 44, June 1948, p. 453-457; discussion, p. 457-458.

Data for high Ni-Mo and high Ni-Mo-Cr alloys with an alloy content of approximately 97%. Introduction of two alloys designated as Chlorimet 2 (Ni-Mo) and Chlorimet 3 (Ni-Mo-Cr). Results of many laboratory and plant investigations on corrosion resistance and application of these alloys.

6b-56. Effect of Atmospheric Corrosion on Maintenance and Economics of Overhead Line Hardware and Guy Strand. Part 3. (Series concluded.) C. J. Couy. *Corrosion,* v. 4, June 1948, p. 287-303.

Maintenance of guy strand, and data on tests to determine rates of diameter decay for areas of various pollution severity and relation of strength and corroded diameter. (Presented at Annual Meeting, N.A.C.E., Chicago, April 7-10, 1947.)

6b-57. Sui Metodi per Attenuare le Corrosioni Alle Canalizzazioni Metalliche Interrate. (Methods for Decreasing the Corrosion of Underground Pipes.) Oscar Scarpa. *La Metallurgia Italiana,* v. 39, Nov.-Dec. 1947, p. 261-266.

Results of investigation which show the effects of currents leaking from electric railway lines. Recommends use of special coating for the pipes.

6b-58. Etude Electrométrique de la Tenue des Aciers Inoxydables dans les Acides. (Electrometric Study of the Behavior of Stainless Steels in Acids.) M. L. Guitton. *Revue de Métallurgie,* v. 44, Nov.-Dec. 1947, p. 330-348.

A method for study of stainless Cr-Mn steel in 5% oxalic acid.

6b-59. Sur la Cinétique de la Réaction d' Oxydation du Fer dans sa Phase Initiale. (Kinetics of the Oxidation of Iron in Its Initial Phase.) Jacques Bénard and Jean Talbot. *Comptes Rendus* (France), v. 226, March 15, 1948, p. 912-914.

The Chévenard microbalance and a recording instrument were used to trace the oxidation-temperature curve in its initial phase. The curve of weight increase vs. time. The heat of activation corresponding to the oxidation of alpha iron, calculated from the curve, is about 59,000 cal.

6b-60. Investigation on Corrosive Matter in Meters. Stanley Jones and J. A. Speers. *Gas Times,* v. 55, May 21, 1948, p. 243.

Previously abstracted from *Gas Journal,* v. 254, April 7, 1948, p. 40. See item 6b-40, 1948.

6b-61. Corrosion in Isomerization of Light Hydrocarbons by Aluminum Chloride-Hydrocarbon Complex Catalyst. N. Fragen, C. W. Nysewander, and W. R. Hertwig. *Industrial and Engineering Chemistry,* v. 40, June 1948, p. 1133-1138.

Corrosion in the liquid phase isomerization of light hydrocarbons by aluminum chloride hydrocarbon complex catalyst causes penetration of carbon steel from 1 to 5 in. per yr. in the reactor, and reaches 15 in. per yr. at points of high turbulence. Lines and vessels handling reaction products exhibit penetration rates about one tenth of those in the reactor. Most successful means for minimizing corrosion involves the use of gunited Lumnite cement reactor liners and Hastelloy B reactor, nozzle, flange, and valve protection.

6b-62. Prevention of Corrosion in Refinery Heat Exchanger Equipment. M. A. Furth. *Petroleum Processing,* v. 3, June 1948, p. 549, 551-552, 554-555.

Types of crudes involved in particular systems, and their relative effects on corrosion; experiences in chemical neutralization of corrosive agents; types and effects of corrosion losses in shell-and-tube and submerged-bundle heat exchangers; types of metal alloys used to resist corrosion of various exchanger parts; and methods of application of such alloys.

6b-63. Pipe Corrosion Mitigation Practices. A. H. Cramer. *American Gas Journal,* v. 168, June 1948, p. 23-27, 58.

Underground pipe-protection practices followed by the Detroit district of Michigan Consolidated Gas Company and reports on field use of the Pearson Pipe Coating Fault Locator.

6b-64. Corrosion of Metals by Hydrochloric Acid at High Temperatures. (In Russian.) Kh. L. Tseitlin. *Zhurnal Prikladnoi Khimii* (Journal of

Applied Chemistry), v. 21, Jan. 1948, p. 35-41.

A mixture of HC1 and H_2O attacks boiler steel only slightly at 140 to 500° C. At 300 to 500° C., stainless Cr steel "EZh27" is more resistant than plain boiler steel. Cast iron at 200 to 310° C. is quite resistant. At high temperatures, dry HCl attacks steel more vigorously than the HCl-H_2O mixture.

6b-65. La passivité des aciers inoxydables et les phénomenes d'adsorption. (Passivity of Stainless Steel and the Phenomenon of Adsorption.) Louis Guitton. *Comptes Rendus* (France), v. 226, March 8, 1948, p. 805-807.

Previously abstracted from *Métaux & Corrosion,* v. 23, Feb. 1948, p. 29-33. See item 6b-52, 1948.

6b-66. Factors of Importance in the Atmospheric Corrosion Testing of Low-Alloy Steels. H. R. Copson. *American Society for Testing Materials, Preprint* No. 20, 1948, 17 pages.

Presents data which show that results depend on location, on duration of tests, on manner of exposure, on method of estimating corrosion, and on weather. 28 ref.

6b-67. Laboratory Corrosion Tests of Iron and Steel Pipes. G. A. Ellinger, L. J. Waldron, and S. B. Marzolf. *American Society for Testing Materials, Preprint* No. 21, 1948, 10 pages.

Results of tests of ten types over periods extending up to ten years in contact with Washington, D. C., tap water continuously circulated through columns of the test samples.

6b-68. Atmospheric Durability of Steels Containing Nickel and Copper—Additional Exposure Data. N. B. Pilling and W. A. Wesley. *American Society for Testing Materials, Preprint* No. 23, 1948, 8 pages.

Observations at the end of 22 years of exposure. The advantage of Ni-Cu steels over Cu steels is becoming more evident. Effects of P, Si, Mn, and C were also evaluated.

6b-69. Control of Metal Corrosion. W. T. McClenahan. *Journal, American Water Works Association,* v. 40, June 1948, p. 606-614.

The occurrence, the probable causes, and the cures of metal corrosion or metal failure in the works of the Chicago Sanitary District.

6b-70. Effects of Hydrogen in the Corrosion of Steel. *Iron Age,* v. 161, June 17, 1948, p. 93-94. Condensed from paper by M. H. Bartz and C. E. Rawlins.

Previously abstracted from full paper in *Corrosion,* v. 4, May 1948, p. 187-206. See item 6b-45, 1948

6b-71. Corrosion: Its Effect in Boiler Systems. Part II. Robert L. Reed. *Combustion,* v. 19, June 1948, p. 43-49.

Corrosion by CO_2, NH_2, and H_2S: acidity; and certain physical factors. Corrective measures for each.

6b-72. NBS Tests Reveal Value of Cathodic Protection. *Industry and Power,* v. 55, July 1948, p. 100.

Previously abstracted from *Journal of Research of the National Bureau of Standards,* v. 40, April 1948. p. 301-313. See item 6b-42, 1948.

6b-73. Oxynitration of Benzene to Picric Acid; Wolffenstein-Böters Reaction. E. E. Aristoff and others. *Industrial and Engineering Chemistry,* v. 40, July 1948, p. 1281-1290.

Information on corrosion of the Duriron reactor during this reaction. 32 ref.

6b-74. Cathodic Protection of Steel in Sea Water With Magnesium Anodes. R. A. Humble. *Corrosion,* v. 4, July 1948, p. 358-370.

Objectives of the research were selection of the most suitable magnesium alloy and a study of minimum current requirements under varying conditions of exposure. Anodic performance of various magnesium alloys and reactions which take place at the cathode.

6b-75. Test of Nickel Plated A.P.I. Type Joint in Flow Line of Corrosive Distillate Well. B. B. Morton. *Corrosion,* v. 4, July 1948, Supplement, 1-3.

Threading of the coupling and that of the pipe, as well as its interior were nickel plated to a depth of about 6 to 8 mils. A part of the nickel had been removed from the chamber of the pipe prior to its assembly into the coupling. Severe galvanic corrosion was expected but not observed. It was concluded that rupture of a nickel-plate coating in a condensate well of the type studied will not result in as serious attack as has been previously anticipated. It is also believed that a thin coating of nickel will be adequate to protect the pipe threads.

6b-76. Basic Principles of Corrosion Control by the Use of Lime. Edward S. Hopkins. *Paper Trade Journal,* v. 127, July 1, 1948, p. 61-63.

Principles of corrosion of iron and steel water pipe as a function of the dissolved oxygen. Neutralization of free CO_2 in low alkaline waters by lime and the subsequent precipitation of a calcium carbonate-ferric oxide coating on pipe surfaces retards corrosion to the point of practical elimination. 11 ref.

6b-77. Crystal Structure of Iron Scale. Part IV. Investigation of the "Intermediate" Temperature Range. (In Russian.) V. I. Arkharov and F. P. Butra. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 211-214.

Investigation showed that the scale formed at high temperatures has a structure directly dependent on the mechanism of oxidation. This mechanism was studied between 500 and 850° C., on the basis of the different scale compositions and structures formed.

6b-78. Combating Corrosion of Iron and Steel. *Metallurgia,* v. 38, June 1948, p. 104-106.

Scope and practical character of the work of the corrosion committee of the British Iron and Steel Research Association. 23 ref.

6b-79. Prevention of Corrosion in Refinery Heat-Exchanger Equipment. M. A. Furth. *Petroleum Refiner,* v. 27, July 1948, p. 129-134.

Various preventive methods; design details; performance under service conditions.

6b-80. Mineral Wool Cement Helps Lick Tank Roof Corrosion in Tropical Clime. *Petroleum Refiner,* v. 27, July 1948, p. 138.

Use of above to prevent H_2S corrosion on the Texas Gulf coast.

6b-81. Der Einfluss der Oxydhaut auf die Korrosionsgeschwindigkeit, insbesondere des Eisens. (The Effect of the Oxide Film on the Rate of Corrosion, Especially of Iron.) F. Tödt. *Archiv fur Metallkunde,* v. 1, June 1947, p. 249-251.

Includes several protective-coating methods.

6b-82. Uber den Einfluss von Sparbeizen und anorganischen Stoffen auf die Korrosion von Eisen in Warmwasser. (The Effect of Inhibitors and Inorganic Matter on the Corrosion of Iron in Warm Water.) W. Machu. *Archiv fur Metallkunde,* v. 1, June 1947, p. 267-270.

Effects of various inhibitors and oxidants on the solubility of iron in water at 60° C.

6b-83. Metallschwund und Katalyse. (Metal Solubility and Catalysis) K. Wickert. *Archiv fur Metallkunde,* v. 1, June 1947, p. 270-275.

Iron dissolves more rapidly in a solution of NaCl or $ZnCl_2$ and oxygen than in distilled water with the same oxygen content. Data on this effect determined by use of an ionometer in terms of mv., which were then converted into pH values. The rate of iron solution varies with the type of electrolyte.

6b-84. Uber den Schutz von Eisenteilen, die mit Seewasser in Beruhrung stehen, durch galvanische Beruhrung mit Zink. (Protection of Iron Parts in Contact With Seawater by Galvanic Contact With Zinc.) F. Tödt. *Archiv fur Metallkunde,* v. 1, June 1947, p. 288-289.

Bauer and Vogel (Germany, 1942) found that 14 sq. cm. of zinc was necessary to protect 120 sq. cm. of iron in dilute salt solution, which is much too large an amount for practical application. However, the present author found that a zinc surface equal to only 0.1% of the iron surface was sufficient under certain conditions.

6b-85. Cathodic Protection of Steel Water Tanks. Peter E. Pallo. *Journal, American Water Works Association,* v. 40, July 1948, p. 701-711.

An investigation to determine degree of protection afforded by aluminum anodes with an applied external potential; magnesium anodes; and the electrodeless circuit with an applied external potential.

6b-86. Cathodic Protection of Under-Ground Structures. *Gas Age,* v. 102, July 8, 1948, p. 25, 57-58.

Tests made to determine value of attaching zinc cylinders to steel specimens as a means of preventing underground electrolysis or corrosion.

6b-87. Effects of Hydrogen in the Corrosion of Steel. *Iron Age,* v. 162, July 29, 1948, p. 78. Condensed from paper by M. H. Bartz and C. E. Rawlins.

Previously abstracted from *Corrosion,* v. 4, May 1948, p. 187-206. See Item 6b-45, 1948.

6b-88. Protection des pipe-lines de la régie autonome des pétroles contre les corrosions électrolytiques. (Protection of the Pipelines of the "Autonomous Oil Administration" Against Corrosion.) Y. Boyer. *Metaux & Corrosion,* v. 23, March-April 1948, p. 79-88.

Methods of protection used by the French Government oil monopoly, including both cathodic protection and coatings.

6b-89. Remarques a propos de corrosions électrolytiques constatées sur un pipe-line de la régie autonome des pétroles. (Remarks Concerning the Electrolytic Corrosion Observed on a Pipe Line of the "Autonomous Oil Administration".) J. P. Verrien. *Metaux & Corrosion,* v. 23, March-April 1948, p. 89-97.

Results of investigation indicate that electrolytic corrosion does not take place spontaneously. Two phases were observed: first, a preliminary phase which may be of

long duration during which no corrosion takes place; and the corrosion period, generally much shorter.

6b-90. Protection galvanique des structures métalliques enterrées ou immergées par les anodes en magnesium. (Galvanic Protection of Underground or Underwater Metallic Structures by Magnesium Anodes.) Bernard J. C. Raclot. *Metaux & Corrosion,* v. 23, March-April 1948, p. 98-102.

Especially the technique of application to underground pipe lines. Charts and diagrams.

6b-91. An Investigation of Boiler-Drum Steel After Forty Years of Service. H. S. Blumberg and G. V. Smith. *Transactions of the American Society of Mechanical Engineers,* v. 70, April 1948, p. 185-198; discussion, p. 198-200.

Examination of materials from seven riveted boiler drums removed from service after 40 years' operation at a temperature and pressure of 388° F. and 200 psi. respectively, revealed no evidence of deterioration in properties of the steel from which they were made.

6b-92. The Statistics of Boiler Embrittlement. C. D. Weir. *Transactions of the American Society of Mechanical Engineers,* v. 70, April 1948, p. 253-256.

The methods of mathematical statistics were applied to the results of experiments carried out with Schroeder detector units. It was shown that differences in composition of the feedwaters with regard to hydroxide, chloride, silica, oxide, and phosphate do not influence materially the cracking susceptibility. Sulphate was found to stimulate cracking somewhat when present at concentrations in the region 200 to 600 p.p.m. Other conclusions.

6b-93. Bacteria That Destroy Concrete and Steel. K. R. Butlin. *Discovery,* v. 9, May 1948, p. 151-155.

Sulphur cycle and how sulphate-reducing bacteria contribute to corrosion of materials. Methods of protection. Electron micrographs of different species of such bacteria.

6b-94. Evolution of Hydrogen From Ferrous Hydroxide. U. R. Evans and J. N. Wanklyn. *Nature,* v. 162, July 3, 1948, p. 27-28.

Literature and certain experiments on the above, which is of importance in connection with the corrosion of iron by pure oxygen-free water since ferrous hydroxide may be formed by reaction of iron and water, with evolution of hydrogen.

6b-95. Climatic Effects on the Corrosion of Steel. J. Dearden *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 241-246.

Observations on the effects of the weather prevailing at the start of exposure, the annual shedding of rust, the explanation when this cannot occur, and the sulphur content of rust formed under various conditions. 11 ref.

6b-96. Recent Developments in Cathodic Protection of Pipe Lines. N. P. Peifer and F. E. Costanzo. *Gas Age,* v. 102, Aug. 5, 1948, p. 21-23.

Two refinements in cathodic corrosion protection of bare underground steel pipe lines. One depends on a refinement of the common method of determining the need for protection and on calculations of current densities required for protection. The other is the use of expendable ribbon-type magnesium anode paralleling the pipe at varying distances computed from predetermined galvanic currents.

6b-97. Fissuration de l'acier doux par corrosion sous contrainte. (Stress Corrosion Cracking of Mild Steel.) J. T. Waber and H. J. McDonald. *Revue de Métallurgie,* v. 45, March-April 1948, p. 93-104.

Previous theories and a theory according to which it is caused by the continuous and combined action of precipitation and stress in accordance with a definite cycle. An important result deduced from the theory is that dissolved nitrogen is responsible for the cracking of steel. 79 ref.

6b-98. Measurement of Galvanic Currents Around an Underground Structure. N. P. Peifer and F. E. Costanzo. *Corrosion and Material Protection,* v. 5. July-Aug. 1948, p. 4-14.

Determinations of the location and intensity of the anodic and cathodic areas on the surface of an underground pipe were made by three different methods: the copper sulphate half-cell electrode, a steel-tipped bar inserted close to the pipe surface, and an earth-current meter. Results show wide variation and indicate that discharge from the pipe varies although potentials remain the same.

6b-99. Cathodic Protection of Steel Water Tanks. Peter E. Pallo, *Water & Sewage Works,* v. 95, Aug. 1948, p. 293-297.

An investigation designed to determine the degree of protection obtained in bare steel tanks provided with an aluminum anode, with an applied external potential, a gal-

vanic magnesium anode without applied potential, and the electrodeless circuit with an applied external potential. A fourth tank, used as a control, was afforded no protection.

6b-100. Corrosion Problems of Offshore Structures. Elton Sterrett. *World Oil,* v. 128, Sept. 1948, p. 84.

Problems and preventive methods.

6b-101. Magnesium Anodes for Pipe Line Protection. D. J. Walraven. *World Oil,* v. 128, Sept. 1948, p. 182, 184, 186.

Use of prepacked combinations of Mg anodes and backfill material to reduce the amount of materials and speed up installation. A suitable backfill surrounding the anode is necessary to improve efficiency and prolong life.

6b-102. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Sept. 1948, p. 105A-106A. Based on report by T. E. Larson, Illinois State Water Survey, Urbana, Ill.

How cathodic protection with magnesium anodes prevented severe underwater corrosion of hot-water tanks.

6b-103. Corrosion intergranulaire des aciers inoxydables austénitiques coulés. (Intergranular Corrosion of Austenitic Stainless Cast Steels.) H. A. Pray. *Revue de Métallurgie,* v. 45, Jan.-Feb. 1948, p. 19-31; discussion, p. 31.

Experimental work for Alloy Castings Institute at Battelle Memorial Institute. Intergranular attack in cast alloys of the 19% Cr, 9% Ni type is caused by precipitation of carbides in the primary grain boundaries. Appearance of precipitates in the ferritic phase in a number of the alloys studied did not cause sensitivity to intergranular attack. 18 ref.

6b-104. Contribution a l'étude de la corrosion intercristalline de l'acier par les nitrates. (Contribution to the Study of the Intergranular Corrosion of Steel by Nitrates.) Michel Smialowsky. *Revue de Métallurgie,* v. 45, Jan.-Feb. 1948, p. 32-37.

Results of a study of the action of ammonium and sodium nitrates plus a series of additives on low-carbon steels. Experimental apparatus and method.

6b-105. Corrosion of Iron and Steel; Atmospheric Protection and Marine Fouling. *Metallurgia,* v. 38, Aug. 1948, p. 201-206.

Summaries of papers on protection against atmospheric corrosion, anti-fouling compositions, and cementiferous paints, and accompanying discussion at a recent meeting of the Iron and Steel Institute and the British Iron and Steel Research Association.

6b-106. Action of Rust-Preventive Oils. E. R. Barnum, R. G. Larsen, and A. Wachter. *Corrosion,* v. 4, Sept. 1948, p. 423-431.

Results of certain experiments, including details of apparatus and procedure. A mechanism for the protective action of oil solutions of polar compounds on steel. 12 ref.

6b-107. High-Temperature Corrosion of Stainless Steels. W. E. Fontaine. *Metal Progress,* v. 54, Sept. 1948, p. 332-336.

Design and specifications for parts of a gas-turbine locomotive, fired with high-sulphur bituminous coal, required some specific information on the resistance of standard types of high-Cr and Cr-Ni-Fe alloys (stainless steels). Test at 2000° F. showed that 25% Cr was necessary to prevent more than superficial oxidation in 150 hr., but it was judged that the alloys studied had little structural value for continuous service at such extreme temperatures.

6b-108. Processing Sour Crude at Globe Oil & Refining Co.'s Lemont, Ill., Refinery. R. B. Pierce, W. F. Krausel, and J. M. Lawson. *Oil and Gas Journal,* v. 47, Sept. 30, 1948, p. 96-97.

Information on metals and alloys used and their resistance to corrosive crudes.

6b-109. A Résumé of Sohio's Experience in Overhead Condensing Equipment. E. N. Salathe. *Proceedings, American Petroleum Institute,* v. 28M (III), 1948, p. 22-25; discussion, p. 25.

Experiences with various types of corrosion and remedial attempts to control them. On shell-and-tube units, polymerization plants, and catalytic crackers.

6b-110. The Use of Chemicals for Retarding Corrosion. H. L. Bedell and V. W. Hatchett. *Proceedings, American Petroleum Institute,* v. 28M (III), 1948, p. 9-17; discussion, p. 17-18.

Use of certain commercial alkaline chemical agents as additives to refinery operating units for retarding the corrosive action of acidic materials present in crude oil or formed during refining processes.

6b-111. Leather Packings and the Pitting of Stainless Steel. H. C. Matheis. *Modern Industrial Press,* v. 10, Sept. 1948, p. 32, 36.

It was found that salts present in the leather caused above pitting.

The same was true for other types of packing material. Use of special impregnating compounds prevented the corrosion.

6b-112. Corrosion Reports by Refinery Analytical Chemist. Part II. Christopher A. Murray. *Petroleum Refiner,* v. 27, Sept. 1948, sec. 1, p. 111-114.

Actual experiences with fire side tube failure in CHP reformer heater; deposit which plugged thermofor catalytic cracking depropanizer charge condenser; and thermofor catalytic-cracking-unit gas-plant-section corrosion survey.

6b-113. Topical Committee on Materials. G. H. Calhoun. *Proceedings, American Petroleum Institute,* v. 27, (IV), 1947, p. 107-116.

Committee report deals with corrosion of condensate wells; corrosion-fatigue testing of sucker-rod materials; standardization of asbestos-cement pipe and fittings; oil-well cements; corrosion resistance of tubing and casing materials; corrosion of tanks; testing of sucker rods and tubing; code of metallurgical terms for ferrous alloys; and other topics. Corrosion-test results for various alloys and coatings in gas-condensate wells, obtained by three companies.

6b-114. Recherches sur la corrosion des fontes par l'aluminium et les alliages légers au Silicium (Alpax et Hypersiliciés) liquides. [Investigations Concerning Corrosion of Castings by Molten Aluminum and Silicon Containing Light Alloys (Alpax and Hypersilicon.)] Paul Bastien and Suzanne Daeschner. *Fonderie,* July 1948, p. 1217-1235.

Results of a study, particularly for the case of cast-iron crucibles used in aluminum and light-alloy melting. Corrosion resistance of different types of cast iron and soft steel with regard to the molten metals. The mechanism of such corrosion is also discussed at length, as indicated by phase diagrams and photomicrographs.

6b-115. Note on a Protective Grease for Threads Exposed Under Corrosive Conditions. M. Cohen, A. C. Halferdahl, and I. E. Puddington. *Canadian Journal of Research,* v. 26, sec. F Aug. 1948, p. 347-348.

Five greases or oils were evaluated in connection with tropicalization of motor vehicles, using a severe cycle of sea-water immersion and moisture condensation. Steel plate, bolt and nut assemblies lubricated with an inhibited aluminum stearate grease (composition given) were much more easily removed than any of the others.

6b-116. Cathodic Protection of Underground Structures. *Drilling Contractor,* v. 4, Aug. 15, 1948, p. 63, 67.

Recent Bureau of Standards work. Previously abstracted from *Journal of Research of National Bureau of Standards,* v. 40, April 1948, p. 301-313. See item 6b-42, 1948.

6b-117. Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03% Max. Carbon Content. W. O. Binder, C. M. Brown, and Russell Franks. *American Society for Metals. Preprint* No. 25, 1948, 48 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1301-1347; discussion, p. 1347-1370.

Results of a basic study of low-carbon austenitic Cr-Ni steels to determine effects of Cr, Ni, C, and N on their susceptibility to intergranular corrosion. Partial immunity was studied from standpoint of time-temperature-precipitation characteristics of the steels.

6b-118. Prevention of Corrosion on Steel. Ivor Richards. *Organic Finishing,* v. 9, Sept. 1948, p. 33-34, 36.

Types of treatment and metal coatings.

6b-119. Corrosion From Flue Gases. E. A. Rudulph. *Corrosion,* v. 4, Oct. 1948, p. 476-477; discussion, p. 477-478.

Solution of a problem of corrosion to complete failure of the housings for electrostatic precipitators which are installed between boilers and induced draft fans in power plants. After several other methods failed, insulation was applied to the outer surface of the ducts, thus preventing radiation of heat and making it possible to hold the temperature of the precipitator chamber above the dew point of the stack gases. This prevented the moisture condensation responsible for corrosion.

6b-120. Fifteen Years Experience in Application of External Corrosion Mitigation Methods to a High Pressure Natural Gas Transmission Line. N. K. Senatoroff. *Corrosion,* v. 4, Oct. 1948, p. 479-491.

Experiences with soil surveys, with various protective coatings, and with cathodic protection. Believes that the latter should be used in most cases in connection with uniform pipe wrapping for the entire length of the line.

6b-121. Organic Chlorides in Wyoming Crudes Found Cause of Plant Corrosion. *Petroleum Processing,* v. 3, Oct. 1948, p. 941, 944.

Crudes from West Texas, Wyoming, Illinois, Kansas, and Louisiana. Only the one from Wyoming contained appreciable amounts of or-

ganic chlorides and these were mainly in the gasoline range between 250 and 350° F. Types of corrosion experienced by different Wyoming refineries, and methods used to prevent it.

6b-122. Steel Embrittlement in Caustic Treating Service. E. L. Hildebrand. *Oil and Gas Journal,* v. 47, Oct. 7, 1948, p. 271, 273-274.

The three conditions that must be fulfilled before caustic embrittlement can occur are a concentrated caustic solution, high stress, and an elevated temperature. Experience has shown that under the conditions described the conventional "hour soaking time per inch of thickness at 1100° F.", stress-relief treatment is sufficient to prevent cracking in forged and wrought low-carbon steel, unless an exceptionally poor joint was made or an unusual condition existed.

6b-123. Value of Nickel Alloy Iron in Salt Water Confirmed. *Inco Magazine,* v. 22, Fall 1948, p. 7-9.

Tests at Kure Beach prove superiority of Ni-resist over bronze as well as ordinary cast iron in resisting corrosion and erosion.

6b-124. Use of Wetting Agents in Conjunction with Acid Inhibitors. P. H. Cardwell and L. H. Eilers. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1951-1956.

Use of wetting agents to lower the rates of attack of HCl solutions containing various thiourea and N-ring compounds on steel. The wetting agents do not inhibit corrosion when used alone with HCl. Theory of the phenomenon. 20 ref.

6b-125. Corrosion of Boiler Steels by Inhibited Hydrochloric Acid. P. H. Cardwell and S. J. Martinez. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1956-1964.

Corrodibility of 22 metals used in boiler construction was determined at various temperatures in inhibited HCl solutions. A study was made of the effectiveness of four acid inhibitors and of the method of preparing the test coupons. 20 ref.

6b-126. Prevention of Corrosion in Sour Wells With Organic Inhibitors. William F. Gross and Howard W. Andrews. *Oil and Gas Journal,* v. 47, Oct. 28, 1948, p. 76-79, 113-114.

Results of a carefully controlled 18-mo. field test of four commercial organic corrosion inhibitors in sour, West Texas oil wells.

6b-127. Passivation of Iron by Gaseous Oxygen. (In Russian.) H. A. Shumilova and R. Kh. Burshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 21, 1948, p. 475-478.

The anodic passivation of iron in a dilute solution previously treated with gaseous oxygen was studied. The influence of temperature on the amount of electricity required to form $Fe(OH)_2$.

6b-128. Corrosion of a Steel Ship in Sea Water. K. N. Barnard. *Canadian Journal of Research,* v. 26, sec. F, Sept. 1948, p. 374-418.

Electrical potentials in the sea close to the hull were studied. The state of the hull was deliberately altered so that the corrosion patterns could be followed under a variety of hull conditions and were supplemented by visual inspections. Some failures of the present anticorrosive technique are indicated and possible remedies suggested.

6b-129. Zur Kenntnis der Korrosionsangriffe durch Vergasertreibstoffe. (Corrosion Caused by Motor Fuels.) P. Schläpfer and A. Bukowiecki. *Schweizer Archiv fur angewandte Wissenschaft und Technik,* v. 14, Sept. 1948, p. 257-274.

The available literature, including the effect of their water content and their physicochemical characteristics. Results of experimental investigation on the basis of which motor fuels are classified into definite groups with respect to their corrosion behavior. Deals only with attack on ferrous metals. 38 ref.

6b-130. The Corrosion of Buried or Submerged Pipes. A. H. Stuart. *Petroleum,* v. 11, Nov. 1948, p. 252-253.

Fundamentals of the problem and results of a series of laboratory experiments made in an attempt to find ways to reduce such corrosion.

6b-131. Corrosion Problems in the Manufacture of Soda Ash by the Ammonia Soda Process. Gustave Heinemann. *Corrosion,* v. 4, Nov. 1948, p. 516-528.

A brief resume of the process, and some of the experiences with corrosion encountered by one producer.

6b-132. Corrosion of Underground Power Cable Sheaths. L. F. Greve. *Corrosion,* v. 4, Nov. 1948, p. 529-540; discussion, p. 541-544.

Several methods employed by a large utility company for mitigating extremely troublesome corrosive conditions caused by local, concentration, and galvanic cells.

6b-133. Pipe Corrosion Mitigation Practices. A. H. Cramer. *World Oil,* v. 128, Nov. 1948, p. 218-220, 222.

Underground pipe protection prac-

tices. Followed by Michigan Consolidated Gas Co.

6b-134. Le fer actif dans les solutions alcalines. (Active Iron in Alkaline Solutions.) Gustav Nilsson. *Métaux & Corrosion,* v. 23, Sept. 1948, p. 206-211.

It was found that, under certain conditions, cathodic treatment facilitates rather than prevents corrosion. Activity of iron in alkaline solutions was demonstrated by means of specific organic and inorganic agents. Method of investigation. 19 ref.

6b-135. Corrosion of Iron by Water-in-Oil Emulsion—Part II. Corrosion of Engines by Emulsions. L. C. Verman, M. L. Khanna, S. K. Das Gupta, and K. A. Nair. *Journal of Scientific & Industrial Research,* v. 7B, Sept. 1948, p. 144-148.

Results of accelerated corrosion tests and long-term engine trials show that sodium nitrite is not suitable for use as an additive. Recommends that 0.5% chromium oleate plus 0.5% chromium naphthenate be used as additives to lubricating oils for low-temperature internal-combustion-engine operation, and for pumps and compressors to inhibit corrosion due to emulsified oil. 14 ref.

6b-136. Mechanism of Corrosion of Copper-Containing Steels. (In Russian.) N. D. Tomashov, G. P. Sinel'shchikova, and M. A. Vedeneeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 105-108.

Various theories concerning the corrosion resistance of steels containing 0.2 to 1.0% Cu. It is believed that the increased corrosion resistance of such steels is caused by deposition of finely dispersed copper, which promotes, under certain conditions, anodic passivity of iron. Experimental results seem to confirm this hypothesis. 12 ref.

6b-137. Intergranular Corrosion of Cast Austenitic Stainless Steels. H. A. Pray. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 387. Translated and condensed from *Revue de Métallurgie,* v. 45, Jan.-Feb. 1948, p. 19-31.

Previously abstracted from original source. See item 6b-103, 1948.

6b-138. A Visual Rating System for Rusted Steel Specimens. Harry L. Faigen. *ASTM Bulletin,* Oct. 1948, p. 39-44.

A convenient system for rating rusted steel surfaces visually is outlined and illustrated. Numbers and letters are employed to designate stages of rusting as defined by verbal descriptions or pictorial representation in a logical and easily remembered succession of steps.

6b-139. Intercrystalline and Other Types of Corrosion of Steam Boilers. R. E. Coughlan, R. C. Bardwell, R. W. Chorley, B. W. DeGeer, M. A. Hanson, T. W. Hislop, Jr., H. M. Hoffmeister, Ray McBrian, Theodore Morris, S. E. Printz, R. W. Seniff, J. M. Short, R. M. Stimmel, J. E. Tiedt, and J. W. Ussher. *American Railway Engineering Association, Bulletin,* v. 50, Nov. 1948, p. 167-169.

Committee report. Use of sodium nitrate as an inhibitor is recommended. Simple device used to detect embrittlement.

6b-140. Underground Leaks Versus Cathodic Protection. Arthur Smith, Jr. *Chemical Engineering,* v. 55, Nov. 1948, p. 139-141.

With the case history of its own Midland plant, Dow documents its claims for cathodic protection. They figure a $12,400 investment has saved $6,500 per year.

6b-141. The Effects of Electrolysis Upon the Strength of Reinforced Concrete. *Engineering,* v. 166, Nov. 5, 1948, p. 453-454.

Results of experimental work on the corrosion of the steel reinforcing rods in concrete and on deteriorative effects on the concrete itself caused by stray currents from electrical machinery. (Based on work of the U. S. Bureau of Standards and by the British Electrical and Allied Industries Research Assn.)

6b-142. Environmental pH as a Factor of Control of Anaerobic Bacterial Corrosion. J. B. Hunter, H. F. McConway, and R. F. Weston. *Oil and Gas Journal,* v. 47, Nov. 11, 1948, p. 249-250.

Effect of increase of alkalinity on growth of this type of bacteria.

6b-143. Pipe-Line Corrosion by Sour Crude Oil. Lyle R. Sheppard. *Oil and Gas Journal,* v. 47, Nov. 11, 1948, p. 298-300, 303, 305.

The main mechanisms of H_2S corrosion of pipe lines carrying sour crude, how to detect sulphide corrosion, hydrogen-permeation effects, and the various methods for prevention of this type of corrosion. 10 ref.

6b-144. Stress-Corrosion Cracking in Alloy-Steel Gas Cylinders. R. C. Gifkins and W. P. Rees. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 109-122, 131.

Experimental data show importance of certain impurities in the stored gases, notably sulphur-containing compounds and hydrocyanic acid.

6b-145. Environmental pH as a Factor in Control of Anaerobic Bacterial Corrosion. J. B. Hunter, H. F. McConomy, and R. F. Weston. *Corrosion,* v. 4, Dec. 1948, p. 567-580; discussion, p. 580-581.

Experimental data on the effect of alkalinity on sulphate-reducing bacteria. Two problems were studied: type of action of pH 5 over 9.0 (bactericidal or bacteriostatic); and possibility of growth recurrence after exposure at high pH.

6b-146. Bearing Corrosion in Turbo-Generators. J. A. Ten Broeke. *Corrosion,* v. 4, Dec. 1948, p. 590-596; discussion, p. 597-598.

Several cases in which stray currents and electrostatic charges caused above type of corrosion.

6b-147. Present Day Aspects of Condensate Well Corrosion. Harry E. Waldrip. *Corrosion,* v. 4, Dec. 1948, p. 611-617; discussion, p. 617-618.

Classification characteristics, methods of detection, costs, and methods of prevention.

6b-148. Causes and Prevention of Drill Pipe and Tool Joint Troubles. Part 3. Drill Pipe. H. G. Texter, R. S. Grant, and S. C. Moore. *World Oil,* v. 128, Dec. 1948, p. 100, 102, 104, 106, 108, 110, 112.

Corrosion-fatigue failure of drill pipe. It has recently been shown that salt, of relatively low concentration, is the principal cause of corrosion fatigue. Service failures and test-specimen results. H_2 or H_2S embrittlement. (To be continued.)

6b-149. Anodic and Cathodic Polarization Curves for Iron and Copper in Sulphate Solutions Containing Oxidizing Agents. (In Russian.) N. D. Tomashov, G. P. Sinel'shchikova, and M. A. Vedeneeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, Aug. 1, 1948, p. 669-672.

Investigated as an aid in determination of the mechanism of corrosion of copper steels. 7 ref.

6b-150. The Corrosion of Mild Steel by Ammonium Sulphate. A. M. Ward. *Industrial Chemist and Chemical Manufacturer,* v. 24, Nov. 1948, p. 722-724.

Results of experiments.

6b-151. The Atmospheric Corrosion of Iron and Steel Wires. J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 276-285.

Results of tests on the corrosion of ferrous wires when exposed in an industrial atmosphere for periods of up to 10 yr. The rate did not vary appreciably with duration of exposure, but was greater for thin than for thick wires. Certain wrought irons and low-alloy steels proved much more resistant than mild steel. Practical applications of these observations.

6b-152. Magnesium Anodes Extend Water Heater Tank Life. Tom D. Fulford. *Electric Light and Power,* v. 26, Dec. 1948, p. 78-80, 82-84.

Results of laboratory and field tests which demonstrate that a magnesium anode will completely stop or markedly reduce corrosion in water-heater tanks. Installation methods.

6b-153. Formation and Application of Phosphate Coatings. Van M. Darsey and Walter R. Cavanaugh. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 351-364; discussion, p. 365.

Previously abstracted from preprint. See item 7-50, 1947.

6b-154. Scaling at High Temperatures in Sulfur Dioxide, Oxygen and Nitrogen-Containing Atmospheres. J. H. Nicholson and E. J. Kwasney. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 681-691; discussion, p. 691.

Previously abstracted from preprint. See item 6-178, 1947.

6b-155. Uber die Korrosion des Eisens unter Schutzfilmen. (Corrosion of Iron Under Protective Coatings.) J. K. Wirth. *Archiv fur Metallkunde,* v. 1, Oct. 1947, p. 445-448; 452-454.

Consists of two separate articles under identical titles. Thorough investigations indicate the influence of such factors as electrolytic solution pressure, electro-osmotic forces, paint-film porosity, and soap formation in the oily pigment mixtures.

6c—Nonferrous

6c-1. The Corrosion of Silver in a Water Saturated Chlorine Atmosphere. Henry B. Linford and Michael J. Ford. *Journal of the Electrochemical Society,* v. 93, Jan. 1948, p. 16-26.

The corrosion of 99.9% silver in a saturated chlorine atmosphere was studied. Effects observed are explained on the basis of concentration of active agent and diffusion through the film of silver chloride of the active agent.

6c-2. Tests, Properties of Corrosion-Preventive Lubricants for Lead-Sheathed Cables in Underground Ducts—A Discussion. Howard S. Phelps and Frank Kahn. *Corrosion,* v. 4, Feb. 1948, p. 37-44.

Desirable specifications for the lubricants and some special test procedures developed for their evalua-

tion. Method of application. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6c-3. Die Oxydationsgeschwindigkeit von Nickel bei Kleinen Zusätzen von Chrom und Mangan. Beitrag zur Theorie des Anlaufvorganges. (The Rate of Oxidation of Nickel With Low Chromium and Manganese Additions. Contribution to the Theory of the Tarnishing Process.) Carl Wagner and Karl-Erik Zimens. *Acta Chemica Scandinanvica,* v. 1, 1947, p. 547-565.

Experimental data and a theoretical development. The rate of oxidation of nickel is markedly increased by small additions of Cr or Mn. Mixed oxide phases containing increased bivalent-nickel concentrations are formed. The forces causing migration in such phases are analyzed. In Ni-Cr alloys with high Cr content, the rate of oxidation decreases considerably. By analogy with other systems, it is assumed that a new phase with low ion motion is formed. 31 ref.

6c-4. Sur l'Attaque de Plomb par le Gaz Sulfureux. (Corrosion of Lead by Sulphur Dioxide). Andre Chretien and Jean Broglin. *Comptes Rendus* (France), v. 225, Dec. 22, 1947, p. 1315-1317.

Using same apparatus as previously described for study of corrosion of other metals by various gases, the effect of SO_2 on lead was investigated. During the reaction, the temperature dropped from 725 to 690° and the pressure rose from 137 to 760 mm. Hg. Two phenomena occur successively: the gas is fixed by formation of the dibasic sulphide and sulphate, then it is liberated by reversal of the reaction.

6c-5. The Action of Natural Waters on Lead. G. Miles. *Journal of the Society of Chemical Industry,* v. 67, Jan. 1948, p. 10-13.

Analyses of a series of natural waters are given, together with results of a standard test for initial action on lead. Correlation between calcium carbonate saturation index, organic content, and the degree of initial action on lead of these waters is attempted.

6c-6. Effect of Inhibitors on the Corrosion of Zinc in Dry-Cell Electrolytes. Clarence K. Morehouse, Walter J. Hamer, and George W. Vinal. *Journal of Research of the National Bureau of Standards,* v. 40, Feb. 1948, p. 151-161.

A study of substitutes for mercury and chromate films in curtailing corrosion of the zinc anode of Leclanche dry cells at high temperatures. Certain organic compounds and certain commercial products were found to be effective. However dry cells made with them did not have the expected increase in shelf-life or electrical output. On the other hand, the paste wall of the dry cell was found to have inhibiting properties. Two active constituents were isolated, and found to be effective in retarding the corrosion. These materials will increase the capacity of dry cells at moderate temperatures.

6c-7. Oxide Films Formed on Titanium, Zirconium, and Their Alloys With Nickel, Copper, and Cobalt; an Electron Diffraction Study. J. W. Hickman and E. A. Gulbransen. *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 158-165.

Structures found are plotted on existence diagrams as functions of time and temperature. Attempts are made to correlate the structures obtained with thermodynamic data reported by other workers. 21 ref.

6c-8. Etude des Traces Noires Produites sur la Peau et les Etoffes par le Port de Bijoux en Or. (Study of Black Streaks Produced on the Skin or Cloth From the Wearing of Gold Jewelry.) Marcel Ballay and Pierre Vogt. *Revue de Métallurgie,* v. 44, July-Aug. 1947, p. 256-260.

Jewelry of various types was tested on numerous wearers and under controlled conditions to determine the reason for streaks. It was found that there is less effect from solid pieces than from chains or other cutwork and that it is caused by the abrasive action of dust and other foreign matter, not by corrosion caused by reaction with skin secretions.

6c-9. Passivity of Chromium. Norman Hackerman and D. I. Marshall. *Journal of the Electrochemical Society,* v. 93, March 1948, p. 49-54.

Surfaces of chromium, treated with nitric acid and then oxidized in air at various temperatures, were examined by electron diffraction and results correlated with results of electrode-potential measurements on other samples subjected to the same treatments. Air-passivation treatment was compared with nitric acid passivation. It was concluded that an oxide film is not the fundamental criterion of passivity in the case of chromium; but that the presence of such a film can greatly influence the potential. (To be presented at meeting of the Society, Columbus, Ohio, April 17, 1948.)

6c-10. Experiments on the Corrosion Resistance of Porous Bronze Compacts Produced by Powder Metal-

lurgy. M. M. Hallett. *Journal of the Society of Chemical Industry,* v. 67, Feb. 1948, p. 57-61.

Test results using a range of acids, alkalis, and salts, under aerated conditions, and in some cases under stagnant conditions, in comparison with the resistance of solid bronze under the same conditions. The corrosion resistance of the two types of material did not differ greatly in many cases, but in caustic soda and in concentrated sulphuric acid, major differences appeared, which were studied in greater detail.

6c-11. Quantitative Evaluation of Corrosive Conditions. W. F. Bonwitt and I. Eisen. *ASTM Bulletin,* March 1948, p. 84-88.

Test using a copper foil in order to calibrate the effect of natural corrosion and of several artificial accelerated corrosion procedures on a metal by observation of electrical resistance.

6c-12. Principes Chimiques et Thermochimiques de la Corrosion des Métaux dans une Solution Aqueuse, Démontrés par l'Exemple du Zinc. (Chemical and Thermochemical Principles of Metal Corrosion in Aqueous Solution Demonstrated on Zinc.) W. Feitknecht. *Métaux & Corrosion,* v. 22, Nov.-Dec. 1947, p. 192-203; discussion, p. 203.

Study of an example of zinc corrosion in chloride solution showed that the corrosion phenomenon cannot be understood without taking into consideration chemical, thermochemical, and electrochemical factors. 15 ref.

6c-13. Dezincification and Erosion-Corrosion. Mars G. Fontana. *Metal Progress,* v. 53, May 1948, p. 686-689.

Third part of a four-installment article on "The Eight Forms of Corrosion".

6c-14. Etude Electrochimique sur le Tantale Actif et Passif par la Methode des Piles. (Electrochemical Study of the Passivity and Activity of Tantalum by the Cell Method.) M. Haissinsky. *Métaux & Corrosion,* v. 23, Jan. 1948, p. 15-18; discussion, p. 18.

Results of a comparative study of electrochemical and other methods.

6c-15. Orientation des Films Minces d'Oxyde Cuivreux Formes sur le Cuivre. (Orientation of Thin Copperous Oxide Films on Copper.) Henri Frisby. *Comptes Rendus* (France), v. 226, Feb. 16, 1948, p. 572-573.

First, calls attention to a major error in a previous note (v. 224, 1947, p. 1003). Results of a study, by means of electron diffraction, of films formed on copper during immersion in boiling water.

6c-16. Mechanism of Action of Bearing Corrosion Inhibitors in Crankcase Lubricants. J. D. Guttenplan and C. F. Prutton. *Lubrication Engineering,* v. 4, June 1948, p. 125-131; discussion p. 131.

Results of studies on oxidizing agents in oil which may be chemically or catalytically destroyed by the inhibitor, and on the formation of surface film on bearing material by the inhibitor. 15 ref.

6c-17. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, June 1948, p. 103A-104A.

Results of an investigation of the mechanism of the unusually rapid oxidation of high-temperature, high-strength alloys that contain molybdenum, by W. C. Leslie and the author at Ohio State, under sponsorship of the Air Materiel Command. Most of the work dealt with a 16-25-6 (Cr-Ni-Mo) alloy.

6c-18. Inhibitor Action in Crankcase Lubricants. C. F. Prutton. *Oil and Gas Journal,* v. 47, June 10, 1948, p. 70-73, 103.

Functions of a crankcase lubricant, and details of the factors involved in producing a lubricant which will be relatively noncorrosive toward Cu-Pb alloy bearings.

6c-19. Uber die Korrosion von Feinzink und Feinzinklegierungen. (The Corrosion of High-Purity Zinc and Its Alloys.) L. W. Haase. *Metalloberflache,* v. 1, April 1947, p. 73-77.

Electrochemical behavior of pure zinc and its alloys for use in water installations. Zinc alloys cannot be substituted for brasses and bronzes in handling water.

6c-20. Crystal Structure of Copper Scale. (In Russian.) V. I. Arkharov and Z. P. Kichigina. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 215-218.

Results of X-ray investigations of scale formed in air at 700, 800, 900, and 1000° C. for oxidation periods of 2 to 48 hr.

6c-21. An Electron Diffraction Study of Oxide Films Formed on Nickel-Chromium Alloys. J. W. Hickman and E. A. Gulbransen. *Metal Technology,* v. 15, June 1948, T.P. 2372, 15 pages.

Results of study made in an attempt to correlate structure with oxidation rates as determined by the vacuum microbalance, and with lifetime tests on heater elements. The 80%-Ni, 20%-Cr series appears most promising, and shows marked improvement as a result of Si additions. 11 ref.

6c-22. An Electron Diffraction Study of Oxide Films Formed on Copper-Nickel Alloys at Elevated Temperatures. J. W. Hickman and E. A. Gulbransen. *Metals Technology,* v. 15, June, 1948, T.P. 2391, 13 pages.

Available literature on structures of Ni and Cu oxide films. Possibility that the mechanisms of corrosion and oxidation are different is suggested by the fact that no unique structural change was found at the composition where the Cu-Ni system approximates zero in magnetic susceptibility and becomes passive to corrosion. It is also believed that rates of formation and diffusion of ions are of importance in determining which oxide will be formed. 14 ref.

6c-23. Stress Corrosion of Manganese Bronze Castings. Thomas L. Sheehan and Howard E. Dickerman. *Foundry,* v. 76, July 1948, p. 82-87, 190, 192.

Previously abstracted from *Journal of the American Society of Naval Engineers,* v. 58, Nov. 1946, See item 6-147, R.M.L., v. 3, 1946.

6c-24. Electrical Contacts; The Effect of Atmospheric Corrosion. U. R. Evans. *Metal Industry,* v. 73, July 2, 1948, p. 10-13.

Investigations suggest that two entirely different types of corrosion product can be produced by atmospheric attack and that these two types affect electrical contact problems in different ways. 31 ref.

6c-25. Die Korrosion von Silber durch Brom. (Corrosion of Silver by Bromine). R. Weiner. *Archiv fur Metallkunde,* v. 1, June 1947, p. 281-284.

The corrosive effect of dry and wet bromine on refined silver. The product of corrosion is an adhesive film of silver bromide which, in the absence of impurities, prevents further corrosion. 11 ref.

6c-26. Tough Materials for Tough Service. *Inco Magazine* v. 22, Summer 1948, p. 8.

70-30 Cu-Ni alloy developed for condenser tube and other corrosion resistant uses shows negligible attack on welded and unwelded samples after 11 years in salt water.

6c-27. Effect of Temperature on the Ferric Chloride Etching of Copper. Luther E. Vaaler. *Photoengravers Bulletin,* v. 37, July 1948, p. 45-47.

Experimental data on effects of temperature of iron chloride on copper etching of line work, and effects of temperature of iron chloride on copper etching of halftones (120-line).

6c-28. Notes on the Prevention of White Powder Corrosion of Cadmium Plate. L. H. Seabright and J. Trezak. *Plating,* v. 35, July 1948, p. 715-718.

Cause and prevention of corrosion of Cd-plated iron parts in electromagnetic assemblies were investigated. The corrosion product was found to be a water-soluble organic material such as cadmium formate, evidently formed by reaction with volatile organic acids resulting from decomposition of impregnated fabric or paper insulation, liquid seals, or paints containing vegetable oils. Corrosion of 17 combinations of Cd, Cd-alloy, or other metal plates with different insulating materials. Absorption of fumes by activated carbon; use of Cu-Ni, Cu-Ni-Cr, Cd-Ni, or Cd-Ni-Cr; or of Cd with cellulose acetate prevent corrosion.

6c-29. Copper Underground: Its Resistance to Soil Corrosion. *Copper Development Association, C.D.A. Publication* No. 40, 1948, 50 pages.

Laboratory studies and results of field tests on copper, lead, steel, and cast iron with particular reference to use of copper pipes for underground gas and water services. 35 ref.

6c-30. Influence de la texture et de l'orientation cristalline sur l'aptitude a l'oxydation seche du cuivre et du fer. (Effect of Structure and Crystal Orientation on the Tendency Toward Dry Oxidation of Copper and Iron.) Jacques Benard and Jean Talbot. *Revue de Métallurgie,* v. 45, March-April 1948, p. 78-85; discussion, p. 85.

Results of a study at about 900°. Effect of rolling, of deformation by stretching, and of crystal orientation on the structure of the oxide layer; and effects of surface state (prepared by electropolishing and by different forms of abrasion) on the course of the oxidation. 11 ref.

6c-31. Influence of Impurities in Lead-Antimony Alloys on Plate Performance of Storage Batteries. (In Russian.) V. P. Mashovets and A. Z. Lyandres. *Zhurnal Prikladnoi Khimii.* (Journal of Applied Chemistry.), v. 21, April 1948, p. 347-361.

Influences of Ag, Bi, As, Fe, Zn, Cu, Ni, Co, Sb, and Mg on chemical stability of 6%-Sb lead alloys. 28 ref.

6c-32. Prevention of Corrosion in Lead-Sheathed Cables by Means of a Vulcanized Protective Covering. B. B. Reinitz and N. A. Zamborsky. *Corrosion,* v. 4, Sept. 1948, p. 432-444; discussion, p. 444.

Methods for prevention of corrosion or damage caused by action of corrosive media, by galvanic action

involving dissimilar metals, by scoring during installation, and by stray and other currents in the presence of an electrolyte. Test procedures include 6-year salt-solution immersion test; internal-pressure bursting test; and manhole bend test. 13 ref.

6c-33. Etude de l'attaque des atmospheres controlées sur les résistors et autres parties des fours en alliages nickel-chrome. (Study of Controlled-Atmosphere Attack on Resistors and Other Nickel-Chromium-Alloy Furnace Parts.) E. H. Bucknall and L. E. Price. *Revue de Métallurgie,* v. 45, May-June 1948, p. 129-138.

The phenomenon known as "green rot" was investigated. Results indicate that the presence of incompletely burned city gas in the furnaces at 950° C. and above may be the cause of the corrosion. The latter may be minimized by addition of Si and Fe to the alloys and by introduction of sulphur into the atmosphere in the form of H_2S.

6c-34. Oxide Films. *Metal Industry,* v. 73, Sept. 3, 1948, p. 186, 193.

Results of electron-diffraction studies of films on Cu-Ni and Ni-Cr alloys.

6c-35. An Observation of Corrosion Cracking Without Stress. W. D. Robertson and H. H. Uhlig. *Journal of Applied Physics,* v. 19, Sept. 1948, p. 864-865.

Fragments of an Mg_2Sn single crystal after disintegration upon immersion in distilled water or dilute NaOH. The fracture appears to be an instance of transcrystalline corrosion cracking in the absence of appreciable stress.

6c-36. Uber Bleikorrosionen an Spinnbad-Eindampfern der Viskosefaserindustrien. (Lead Corrosion of Centrifugal Driers Used in the Viscose-Fiber Industry.) Theodor Kleinert and F. Pospischil. *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Osterreichs,* v. 2, July 1948, p. 45-48.

As a result of investigation, it was found to have an essentially electrochemical character.

6c-37. Mechanism of the Rapid Oxidation of High Temperature, High Strength Alloys Containing Molybdenum. W. C. Leslie and M. G. Fontana. *American Society for Metals, Preprint* No. 26, 1948, 32 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1213-1244; discussion, p. 1244-1247.

Investigates the unusually rapid oxidation at high temperatures of a 16%-Cr, 25%-Ni, 6%-Mo alloy and similar alloys containing over 3% Mo and a considerable proportion of iron. Structure and composition of the oxide and the microconstituents were studied. A survey was made of the effects of the more volatile metal oxides on the oxidation of various metals and alloys. Effects produced by changes in the alloy composition, by stress, surface finish, coatings, and circulation of the oxidizing atmosphere.

6c-38. Polarity of D-C Control; An AIEE Committee Report. *Electrical Engineering,* v. 67, Oct. 1948, p. 985.

Polarity of coil connections is an important factor in preventing coil corrosion. Replies to A.I.E.E. questionnaires indicated that there was no trouble resulting from coil corrosion when the negative connection was used, while more than 50% of the companies using the positive connection reported corrosion trouble.

6c-39. Joints and Clamps for Aluminum Conductors. Gordon B. Tebo. *Electrical Engineering,* v. 67, Oct. 1948, p. 986. Condensed from paper to be published in *A.I.E.E. Transactions,* v. 67, 1948.

Three long-term exposure tests were made on live-line tap clamps, U-bolt clamp connections between steel-reinforced aluminum-cable and copper cable, and various types of sleeve joints. During the exposure periods of 5 to 7 years, the joints were subjected to a load cycle and, periodically, measurements of electrical resistance were made. Following the exposure, some specimens were examined for corrosion, and subjected to heat runs and short-circuit current tests.

6c-40. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 99A-100A.

Corrosion resistance and mechanical and physical properties of titanium and an 89%-Ti, 11%-Cr alloy.

6c-41. An Electron Diffraction Study of Oxide Films Formed on Hastelloy Alloys A, B, C, and D. J. W. Hickman and E. A. Gulbransen. *Journal of Physical & Colloid Chemistry,* v. 52, Oct. 1948, p. 1186-1197.

Results of above study are presented as existence diagrams on a time-temperature scale. Results which should be obtained under identical experimental conditions. 12 ref.

6c-42. Influence of Additions to Lead-Antimony Alloys on the Performance of the Plates of Lead Storage Bat-

teries. **II. Investigation of the Kinetics of Corrosion.** V. P. Mashovets and A. Z. Lyandres. **III. Overvoltage of Hydrogen on Alloys and Overvoltage of Oxygen on Oxidized Alloys.** V. P. Mashovets and V. N. Fateeva. (In Russian.) *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 21, May 1948, p. 441-455.

In Part II, the characteristics of a series of Pb-Cd alloys containing various small admixtures of Ag, Bi, As, Fe, and Zn, with regard to their corrosion when used as storage-battery plates, were determined. Lead containing no Cd, but 0.33% Ca was also evaluated. The protective effect of Ag, the negative influence of Bi, and the harmful effect of Zn. In Part III, results of overvoltage measurements using specially developed apparatus and a similar series of alloys to that tested in Part II. 11 ref.

6c-43. Corrosion of Copper in Hydrochloric Acid. Paul J. Gegner. *Corrosion,* v. 4, Dec. 1948, p. 619-620.

Experience in which copper cooling tubes were corroded by flushing periodically for scale removal with 16 to 20% HCl plus an inhibitor. Available information indicates that intermittent exposure to HCl up to 24% concentration should not cause excessive attack.

6c-44. Intercrystalline Failure of Brasses and Aluminium Brasses in Air, Ammonia, and Certain Aqueous Solutions and Molten Metals. Marjorie E. Whitaker. *Metallurgia,* v. 39, Nov. 1948, p. 21-29.

Research carried out during a period of six years. The first section consisted of an investigation of the behavior of plain brasses and brasses containing up to 4% Al in various media. Alpha, alpha-beta, and beta alloys were included, mainly in the extruded condition, but in some cases cast. The latter part of the research was concerned with the susceptibility of certain cast aluminum brasses to intercrystalline failure under conditions of stress. (To be continued.)

6c-45. Attack on Four Heat Resisting Alloys by Various Compounds After 17 Hr. Heating in Air at 1500 F. *Materials & Methods,* v. 28, Dec. 1948, p. 105, 107.

Qualitative effect of 60 inorganic compounds on S-816, S-890, Hastelloy B, and Haynes Stellite No. 21. Compositions of the alloys and attack of 16 of the compounds in air, CO_2, and helium under the same conditions otherwise.

6c-46. Rating Exposure Test Panels of Decorative Electrodeposited Cathodic Coatings. W. A. Wesley. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 803-814; discussion, p. 815-821.

Previously abstracted from preprint. See item 8-116, 1947.

6c-47. Inspection of Exposure Test Panels With Nondecorative, Electrodeposited Cathodic Coatings. H. A. Pray. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 822-825; discussion, p. 815-821.

Previously abstracted from preprint. See item 8-115, 1947.

6c-48. Inspection of Exposure Test Panels With Anodic Electrodeposited Coating. Gustaf Soderberg. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 826-831; discussion, p. 815-821.

Previously abstracted from preprint. See item 12-109, 1947.

6c-49. Beiträge zur Frage der Wasserdampfkorrosion von Zinklegierungen. V. Eine Beobachtung uber die Bildung von Wasserstoff. (The Problem of Corrosion of Zinc Alloys by Water Vapor. V. An Observation Concerning the Formation of Hydrogen.) Karl Löhberg. *Metallforschung,* v. 1, Sept. 1946, p. 65-66.

It is shown that hydrogen is evolved when water vapor corrodes Zn-Al alloys containing lead. Factors and additions which accelerate and decelerate the corrosion of these alloys.

6c-50. Beiträge zur Frage der Wasserdampfkorrosion aluminiumhaltiger Zinklegierungen. VI. Uber die Temperahurabhängigkeit der Wasserdampfkorrosion. (The Problem of Corrosion of Aluminum-Containing Zinc Alloys by Water Vapor. VI. Concerning the Effect of Temperature on Water-Vapor Corrosion.) Karl Löhberg. *Metallforschung,* v. 1, Sept. 1946, p. 66-70.

Three zinc alloys with different Al contents were subjected to the corrosive actions of tap water, water vapor, and air at different temperatures.

6c-51. Uber eine hochaluminiumhaltige Zinklegierung. IV. Korrosionsverhalten von Knetlegierungen. (A High-Aluminum Zinc Alloy. IV. Corrosion Properties of Malleable Alloys.) Erich Gebhardt. *Metallforschung,* v. 2, Oct. 1947, p. 310-320.

Results of stress-corrosion testing in a humid atmosphere at 95° C. and in contact with artificial sea water, for a series of the above alloys made from pure and impure base metals. Results showed that, in general, the alloys made from pure metals have the highest resistance to stress corrosion.

6c-52. Die inter- und intrakristalline Korrosion und ihre Ursachen. II. (The Nature and Causes of Inter- and Intra-Crystalline Corrosion. II.) Friedrich-Carl Althof. *Metallforschung,* v. 2, Nov. 1947, p. 321-331.

The study included stressed and unstressed brasses (55 to 86% Cu) which were exposed to different corrosives. It was shown that corrosion in ammonia depends largely on the formation of complex compounds and that the tendency to the above types of corrosion depends on Cu contents and stresses. Results indicate that such corrosion is caused by interatomic reactions. 50 ref.

6d—Light Metals

6d-1. The Corrosion of Metals—Part VIII. Aluminum and Its Alloys. (Continued). *Sheet Metal Industries,* v. 25, Jan. 1948, p. 135-142.

Continues review of recent developments reported in the literature.

6d-2. Observations Relatives a l'Influence de l'Ecrouissage sur le Potentiel de Dissolution de l'Aluminum. (Observations Relative to the Effect of Cold Working on the Solution Potential of Aluminum.) Y. Druet and P. A. Jacquet. *Métaux et Corrosion,* v. 22, Sept. 1947, p. 139-141.

Cold work makes the dissolution potential of extra pure aluminum more electronegative in a 3% NaCl solution. For verification and extension of these observations further tests are now under way. 11 ref.

6d-3. Corrosion Cracking of Magnesium Alloys. (In Russian). E. M. Zaretskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Sept. 1947, p. 823-829.

The corrosion resistance of 1-mm. sheet containing 5.62 to 5.84% Al; 0.95% Zn; 0.38% Mn; 0.09% Si, and 0.05% Fe was investigated under conditions of tensile stress and at temperatures from room to 420° in air and in various other media. Attempts to improve stress-corrosion resistance by cold working or heat treatment were unsuccessful.

6d-4. Corrosion Cracking of Cast Magnesium Alloys. (In Russian). E. M. Zaretskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Sept. 1947, p. 830-840.

Stress-corrosion resistances of cast magnesium, of the alloy mentioned in the preceding abstract, and of another one containing 10% Al, 0.20%Mn, 0.04% Fe, and 0.99% Si, were investigated. The first was not sensitive to stress-corrosion; the cast form of the second, contrary to the cold worked form, is also not sensitive; the latter cast alloy has a slight tendency toward stress-corrosion, which can be eliminated by proper heat treatment and quenching procedure.

6d-5. Corrosion Characteristics of Some Magnesium-Zinc-Calcium Alloys. G. C. Kuczynski and F. Schonfeld. *Journal of Electrochemical Society,* v. 93, Feb. 1948, p. 41-46.

The resistances to corrosion of 45 cast Mg-Zn and Mg-Zn-Ca alloys were investigated by 14-day exposure to an alternate immersion test. The corrosion rate increased with increasing Zn content in the range from 0 to 5.5% Zn. The rate was sharply reduced by addition of 0.10 to 0.55% Ca. 10 ref. (To be presented at Columbus, Ohio, meeting of the society, April 14-17, 1948).

6d-6. The Mechanism of the Corrosion of Aluminum. J. M. Bryan. *Chemistry & Industry,* Feb. 28, 1948, p. 135-136.

Properties of the oxide film are discussed in relation to the known facts concerning aluminum and the electrochemical theory of corrosion. A modification of the usual electrochemical explanation is suggested to account for the behavior of aluminum in alkaline solution. 13 ref.

6d-7. The Corrosion of Metals—Part IX. Magnesium and Its Alloys. (Continued.) *Sheet Metal Industries,* v. 25, March 1948, p. 541-546.

Galvanic corrosion and its relation to design; stress-corrosion; and corrosion-fatigue.

6d-8. Corrosion of Metals With Oxygen Depolarization. (Continued.) *Light Metals,* v. 11, March 1948, p. 155-160.

This section of condensation of, and commentary on, Russian book by N. D. Tomashoff deals with cathode characteristics with special reference to aluminum and its alloys.

6d-9. The Corrosion of Aluminum is Shown in the Return of Eros. *Light Metal Age,* v. 7, April 1948, p. 6-9, 26.

Results of close examination of the condition of famous London statue. Details of its condition after 54 years' exposure, of some little known features in its construction and assembly, of certain repairs and renovations effected prior to reinstatement, and of the method employed to clean the deposited grime from the aluminum surface to reveal the true character of the underlying patina.

6d-10. Oxide Films on Metals. Part III. Electronographic Investigation of Oxide Films Formed on Aluminum Under Conditions of the Gaseous Dis-

charge. (In Russian.) P. D. Dankov and D. V. Ignatov. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), Jan.-Feb. 1948, p. 29-39.

The structure and mechanism of oxide-film formation on Al were studied using glow discharge, both cathodic and anodic oxidation being investigated. Such oxidation was infinitely more rapid than molecular oxidation. Cathodic oxidation was faster than anodic, and the cathode film had a more regular structure (that of γ-Al_2O_3) than the anodic film which had a structure resembling that formed by air oxidation at room temperatures. Conclusions regarding the role of the electrical field in electrolytic oxidation and regarding differences between the mechanisms of air and electrolytic oxidation. 10 ref.

6d-11. The Corrosion of Metals. Part IX. Magnesium and Its Alloys. (Concluded.) *Sheet Metal Industries,* v. 25, April 1948, p. 963-970, 978.

Effect of heat treatment, including annealing temperature; effect of alloying constituents; effects of impurities; resistance to outdoor exposure, to salt solutions and sea water, to nonaqueous solutions, and to leaded gasoline. 13 ref.

6d-12. Magnesium for Cathodic Protection of a Municipal Piping System. K. D. Wahlquist and Oliver Osborn. *Journal of the American Water Works Association,* v. 40, May 1948, p. 495-503.

Ability of magnesium to halt corrosion, theory and practice of its use, its natural advantages and its economic aspects, based on observations of a proven installation at Lake Jackson, Tex. (Presented at Michigan Section Meeting, American Waterworks Assoc., Bay City, Mich., Sept. 19, 1947.)

6d-13. Aluminum-Sheathed Power Cables. Part II. (Concluded.) *Engineer,* v. 165, April 30, 1948, p. 422-423.

Corrosion resistance and protective methods; also methods of installation.

6d-14. Sur la Cinétique de l'Oxydation du Magnésium. (Kinetics of the Oxidation of Magnesium.) Haldun N. Terem. *Comptes Rendus* (France), v. 226, March 15, 1948, p. 905-906.

The sudden increase in activity close to the point of combustion, observed by Pilling and Bedworth, was not confirmed by the present author, although there is a sudden increase as the combustion temperature is reached. The rest of the curve shows an induction period similar to that of Be and Al.

6d-15. Influence de l'orientation des contours de grains de l'aluminium de haute pureté sur leur attaque par l'acide chlorhydrique. (Influence of Orientation of the Shape of the Grains in High-Purity Aluminum on Attack by Hydrochloric Acid.) Nicolas Yannaquis and Paul Lacombe. *Comptes Rendus* (France), v. 226, Feb. 9, 1948, p. 498-499.

Results of investigation indicated that the relative orientation of adjacent crystals does not influence their resistance to chemical attack at their points of contact. The shape of grains having a definite orientation is believed more important.

6d-16. The Dissolution of Aluminum in Sodium Hydroxide Solutions. Michael A. Streicher. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 285-316.

The effects of immersion time, temperature, concentration, and applied external current. A technique resulting in reproducible dissolution rates. It was found that the various phenomena observed may be explained in terms of electrochemical theory. 45 ref.

6d-17. Characteristics of Aluminum Make It Suited to Outdoor Reflector Use. W. Irby. *Materials & Methods,* v. 27, June 1948, p. 75-78.

Resistance to corrosion and discoloration and the high reflectivity of alclad, plus ease of fabrication, result in its use for outdoor lighting units.

6d-18. Protective Films; Natural Formation on Aluminum and Its Alloys. F. A. Champion. *Metal Industry,* v. 72, May 28, 1948, p. 440-442, 444; June 4, 1948, p. 463-464.

Results of researches carried out on corrosion-time curves of aluminum. It is shown that the corrosion follows an exponential law in all cases where film formation is possible. Under some conditions there may be an initial induction period.

6d-19. Uber die Korrosion von Mg-Mn-Gusslegierungen und Halbzeugen. (Corrosion of Mg-Mn Cast Alloys and Semi-Finished Products). A. Beerwald. *Archiv fur Metallkunde,* v. 1, June 1947, p. 284-285.

About 0.9% Mn produces the maximum corrosion resistance. In contrast to pure magnesium and aluminum alloys containing Mg, iron (not exceeding 0.9%) has no effect on corrosion resistance.

6d-20. Acetic + Anhydride = Corroded Aluminum. *Chemical Engineering,* v. 55, July 1948, p. 256. Based on paper by G. Benson and R. M. Kitchen.

Acetic acid which contains traces of water is not corrosive to Al. Addition of acetic anhydride to the acid is the only way in which anhydrous conditions are likely to be produced. Hence this should be avoided when using Al containers.

6d-21. Formation of the Natural Oxide Film on Aluminum. Fred Keller and Junius D. Edwards. *Metal Progress,* v. 54, July 1948, p. 35-41.

Recent work on measurement of the rate of formation of the film at ordinary and at elevated temperatures.

6d-22. Le procédé framalite protection contre la corrosion et sous-couche d' accrochage des peintures. (The "Framalite" Process for Protection Against Corrosion and Subsurface Attack of Coated Objects.) Jean Frasch. *Revue de L'Aluminium,* v. 25, May 1948, p. 176-180.

Development and properties of a special composition known as "Framalite" for passivation of aluminum for protection against corrosion and for treatment prior to painting. The material consists of a gelatine emulsion of bichromate containing zinc carbonate for stabilization against effects of moisture. Methods of application and protection afforded to test panels.

6d-23. Study of the Aluminum Oxide Layer on Aluminum Anodes of Electrolytic Condensers. (In French.) E. Brandenberger and R. J. Häfeli. *Helvetica Chimica Acta,* v. 31, June 15, 1948, p. 1168-1172.

The method of Treadwell and collaborators (dissolving the base metal by means of dry HCl gas in anhydrous ether) was used to separate the oxide film. The latter was examined using radiographic technique to determine effect of voltage on structure of the oxide obtained on electrolysis. Phases formed at low, medium, and high voltages.

6d-24. Corrosion-Resistant Aluminum-Magnesium Alloys. P. Brenner and W. Roth. *Engineering,* v. 166, July 9, 1948, p. 44-47. A condensation.

Results of investigation made in order to determine the most suitable heat treatment for Al-Mg alloys containing 5 to 9% Mg and the effect of some of the most promising additions of small amounts of other metals in combination with the heat treatment.

6d-25. Composition and Properties of the Natural Oxide Film on Aluminum. Fred Keller and Junius D. Edwards. *Metal Progress,* v. 54, Aug. 1948, p. 195-200.

Films that form naturally on aluminum are undoubtedly closely related to the unusual corrosion and weathering resistance of the metal and its alloys. It presents an effective barrier to oxygen and water, and to many chemical solutions.

6d-26. Uber eine hochaluminiumhaltige Zinklegierung III. Wasserdampfkorrosion von Knetlegierungen. (High-Aluminum Zinc Alloys. III. Water Vapor Corrosion of Malleable Alloys.) Erich Gebhardt. *Metallforschung,* v. 2, July-Aug. 1947, p. 225-230.

Results of corrosion tests with water vapor at 95° C. Complete experimental data.

6d-27. Beiträge zur Frage der Wasserdampfkorrosion aluminiumhaltiger Zinklegierungen. IV. Uber den Einfluss von Blei. (Water Vapor Corrosion of Aluminum Containing Zinc Alloys. IV. The Effect of Lead.). Karl Löhberg. *Metallforschung,* v. 2, July-Aug. 1947, p. 230-232.

The distribution of lead in a eutectic Zn-Al alloy is determined by adding a mixture of lead and its radioactive isotope, thorium B. Corrosion tests prove that water-vapor corrosion tends to start at the lead aggregates.

6d-28. Notiz uber das Reaktionsvermögen von Wasserdampf und Wasserstoffsuperoxyd mit Leichtmetallen bei höheren Temperaturen. (The Reactivity of H_2O and H_2O_2 on Light Metals at Elevated Temperature.) Oswald Kubaschewski and Hans Ebert. *Metallforschung,* v. 2, July-Aug. 1947, p. 232-235.

Experiments on Mg, Al, Mg-Al, and Mg-Ca alloys. Test results.

6d-29. Corrosion of Metals With Oxygen Depolarization. *Light Metals,* v. 11, July 1948, p. 388-396.

Peculiarities in the corrosion-mechanism of aluminum and its alloys. (To be concluded.)

6d-30. La corrosion intercristalline de l'aluminium de haute pureté et ses conséquences au sujet de la nature des joints de grains. (Intercrystalline Corrosion of High-Purity Aluminum as Influenced by the Nature of the Grain Boundaries.) Paul Lacombe and Nicolas Yannaquis. *Revue de Métallurgie,* v. 45, March-April 1948, p. 68-76; discussion, p. 76-77.

Literature and experimental results. Both chemical and electro chemical attack were investigated.

The usual explanation based on the presence of impurities is not valid for very pure aluminum. The amount of attack varies in accordance with grain-boundary contour, which can be explained on the basis of more or less void volume. 17 ref.

6d-31. Sur l'oxydation de l'aluminium a basse température. (Oxidation of Aluminum at Low Temperatures.) N. Cabrera. *Revue de Métallurgie,* v. 45, March-April 1948, p. 86-92.

A theory of oxidation at low temperatures and results of experiments mostly at room temperature, but also a few at temperatures up to 450° C., in which very thin films of Al, prepared by vacuum deposition on glass, were exposed to dry oxygen, dry ozone, ultraviolet irradiation, moist air, and moist oxidation. Optical factors of the films (transmission and reflection) were measured before and after exposure, as these have a direct relationship to the degree of oxidation. The method is not satisfactory at elevated temperatures. 14 ref.

6d-32. Stress-Corrosion Tests on High-Strength Aluminum Alloy Sheet. Hugh L. Logan and Harold Hessing. *Journal of Research of the National Bureau of Standards,* v. 41, July 1948, p. 69-85.

The materials were exposed unstressed and stressed in tension to three-quarters of the yield strength in a sodium chloride hydrogen peroxide solution and in a marine atmosphere. 13 ref.

6d-33. Aluminium-Zinc-Magnesium Alloys. Types of Alloys—Results of Tropical Exposure Tests. *Metal Industry,* v. 73, Aug. 20, 1948, p. 152-153. Based on recent B.I.O.S. report.

Results of wartime German research on four different alloys containing over 90% Al.

6d-34. Recent Developments in Corrosion-Resistant Aluminium-Magnesium Alloys. P. Brenner. *Journal of the Institute of Metals,* v. 74, Dec. 1947, p. 159-190.

Influence of chemical composition and thermal treatment on the intercrystalline corrosion of Al-Mg alloys containing 5-9% Mg. A new method of heat treatment is suggested in which the alloy is cooled very slowly from the homogenizing temperature at about 50° C. per hr. Tests and service trials indicate that alloys treated by this method are immune to intercrystalline-corrosion and stress-corrosion failure even at the high temperatures encountered under tropical conditions. 35 ref.

6d-35. Examination of Aluminium Conductor Cables After 15-25 Years' Service. J. Herenguel. *Metallurgia,* v. 38, Aug. 1948, p. 244. Translated and condensed from *Revue de l'Aluminium,* Dec. 1947, p. 357-360; March 1948, p. 73-78.

Results of examination show generally very good condition. A satisfactory lifetime of 50 years is estimated.

6d-36. Stress-Corrosion Tests Evaluate Alloys. *Aviation Week,* v. 49, Sept. 20, 1948, p. 25, 28, 30.

Previously abstracted from article by Hugh L. Logan and Harold Hessing, *Journal of Research of the National Bureau of Standards,* v. 41, July 1948, p. 69-85. See item 6d-32, 1948.

6d-37. La corrosione sotto tensione: risultati di recerche effettuate su alcune leghe di alluminio. (Stress Corrosion: Results Obtained for Certain Aluminum Alloys.) E. Hugony. *Alluminio,* v. 17, May-June 1948, p. 225-247.

Results of an extensive investigation for alloys of the Al-Mg and Al-Si-Mg-Cr types. Special test method used. 70 ref.

6d-38. Welded Aluminum Alloy Pipe Lines. B. J. Fletcher. *Oil and Gas Journal,* v. 47, Sept. 23, 1948, p. 207-208, 211, 301-302, 304.

Production, properties, and installation for handling sour crudes.

6d-39. Stress-Corrosion Tests of High Strength Aluminum Alloys. Hugh Logan and Harold Hessing. *Light Metal Age,* v. 6, Oct. 1948, p. 18, 27.

Previously abstracted from *Journal of Research of the National Bureau of Standards,* v. 41, July 1948, p. 69-85. See item 6d-32, 1948.

6d-40. Sull 'impiego dell 'alluminio nell'industria olearia. (Application of Aluminum in the Food-Oil Industry.) R. Frezzotti. *Alluminio,* v. 17, July-Aug. 1948, p. 342-347.

Two-year immersion in olive oil indicates that welded aluminum (99.0 to 99.5%) containers may be used for storage and transportation of the oil.

6d-41. Testing Stress-Corrosion Resistance of Aluminum Alloys. *Steel,* v. 123, Nov. 8, 1948, p. 121-122.

New test procedures developed and used by the National Bureau of Standards.

6d-42. Intercrystalline Corrosion of Aluminum Alloys. I. Duralumin. (In Russian.) A. I. Golubev. *Zhurnal Fi-*

zicheskoi Khimii (Journal of Physical Chemistry), v. 22, May 1948, p. 591-601.

With particular emphasis on the corrosion resistance of the intermetallic compound, $CuAl_2$, formed during aging of aluminum. The corrosion resistance of $CuAl_2$ was found to be considerably lower than that of aluminum. Results of the investigation permit a new theoretical approach. 12 ref.

6d-43. Magnesium Alloys: Their Corrosion Behavior. *Magazine of Magnesium,* Nov. 1948, p. 2-5.

6d-44. Recherches récentes sur l'aluminium de tres haute pureté. (Recent Research on Very Pure Aluminum.) G. Chaudron. *Helvetica Chimica Acta,* v. 31, Oct. 15, 1948, p. 1553-1570.

Electrolytically purified aluminum (99.998%) was investigated in relation to passivity to HCl, preparation of the surface, kinetics of the oxidation of exposed aluminum, effects of corrosion, structure, and recrystallization. 27 ref.

6d-45. The Effect of Small Lead and Silver Additions on the Corrosion Resistance of Castings of Magnesium and Certain of its Alloys at Elevated Temperature and High Humidity. R. R. Rogers and W. Dingley. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 693-701; discussion, p. 702-703.

Previously abstracted from preprint. See item 6-62, 1947.

6d-46. Uber das Wachstum und die Struktur dunner Oxydschichten auf Aluminium. (The Growth and Structure of Thin Oxide Films on Aluminum.) Georg Hass. *Zeitschrift fur anorganische Chemie,* v. 254, Sept. 1947, p. 96-106.

Electron diffraction, the electron microscope, and Drude's polarization method were used to investigate the thickness and structure of the above films and the effect of temperature on the rate of oxidation of Al. Electrolytically produced aluminum oxide foil was found to change at 700° C. from the amorphous into the crystalline state. 12 ref.

SECTION VII

CLEANING AND FINISHING

7a—General

7a-1. American Anticorrosive and Antifouling Paints. *Engineer,* v. 184, Nov. 21 1947, p. 474-476.

Procedures and materials used by U. S. Navy.

7a-2. Metal Finishing—Emphasis Swings to Utilitarian Finishes. Adolph Bregman. *Iron Age,* v. 161, Jan. 1, 1948, p. 184-189.

Recent developments and future prospects in metallic and nonmetallic coatings, applied by electrolytic and nonelectrolytic methods.

7a-3. Metalizing. Rick Mansell. *Western Metals,* v. 5, Dec. 1947, p. 22-24.

Techniques and applications.

7a-4. The Pullman-Standard Finish. Part 2. W. J. Boltze. *Industrial Finishing,* v. 24, Dec. 1947, p. 34-36, 38.

Methods used in painting and decorating modern streamlined passenger cars. (Concluded.)

7a-5. Surface Treatment. *Steel,* v. 122, Jan. 5, 1948, p. 235-236, 238-240.

Brief reports on new developments: Consumption of Protective Coatings at Highest Rate, by C. R. E. Merkle; Growing Use of Enameled Steel Seen for Housing, by E. Hogenson; Emphasis Is on Obtaining Cleaner Base Metal for Plating, by C. B. F. Young; Trend Toward Combined Use of Plating With Organic Coatings, by Richard O. Loengard; Use of Titanium Opacified White Enamels to Broaden, by W. A. Deringer; Several Finishing Processes Combined in One Sequence, by G. H. Pimbley; Aluminum, Zinc, Phosphate Coated in Single Solution, by V. M. Darsey; Galvanizing Dross Losses Corrected by Kettle Lining, by W. H. Spowers, Jr.; Metal Corrosion Due to Gas Combustion Studied, by Eugene D. Milener; Solventless Vehicles Introduced in Coatings for Various Uses, by C. Stewart Ferguson; New Raw Materials Available for Metal Protective Paints, by George Diehlman; Backlog for Zinc-Coated Products Still Heavy, by Ernest V. Gent; Hot Dip Galvanizing Aided by Mechanical Handling, by Wallace G. Imhoff; Enameling Industry Limited by Raw Material Shortages, by G. H. McIntyre; Cites Recent Developments in Processes for Coating Aluminum, by F. Keller; Rapid Expansion Noted in National Plating Capacity, by Myron B. Diggin; Progress in Finishes Important From Cost Point of View, by Colin G. Fink; Sees Need for Speedier Finish Evaluating Methods, by Wm. E. Shaw.

7a-6. Unusual Masking Expedites Finishing. Herbert Chase. *Organic Finishing,* v. 8, Dec. 1947, p. 24-25, 27-29.

Spraying of restricted areas of chromium-plated die castings is done through masks produced by plating a shell of metal on the die casting and then cutting out the areas of the shell through which the spray must be applied.

7a-7. Health Hazards of Metal Cleaning Compounds. Part II. P. M. Van Arsdell. *Organic Finishing,* v. 8, Dec. 1947, p. 30-33, 36-38, 45.

Toxic properties of benzene, toluene, xylenes, ethyl benzene, and coal-tar solvents. Compositions of various proprietary metal cleaners and data on maximum allowable vapor concentrations for 8 hr. exposure, flammability ratings, flash points, and explosive limits.

7a-8. Enamel Linings for Metal Containers. Frederick W. Bogert. *Organic Finishing,* v. 8, Dec. 1947, p. 39-45.

Classifications of interior coatings; specifications; coating methods; evaluation of coatings; other considerations.

7a-9. Fundamental Aspects of Metal Cleaning. Jay C. Harris. *American Ceramic Society Bulletin,* v. 26, Dec. 15, 1947, p. 389-392.

The forces involved in the attraction between the metal surface and the various contaminants encountered; means for neutralization of these forces; materials and methods with which to accomplish cleaning.

7a-10. Pyrolytic Plating; Carbonyl Deposition of Molybdenum, Tungsten and Chromium. J. J. Lander and L. H. Germer. *Metal Industry,* v. 71, Dec. 5, 1947, p. 459-461; Dec. 12, 1947, p. 487-489.

Previously abstracted from *Metals Technology.* See 7-391, R.M.L., v. 4, 1947 (*Metals Review,* Nov. 1947).

7a-11. The Prevention of Rust. H. Sanders. *Machinery Lloyd* (Overseas Edition), v. 19, Dec. 6, 1947, p. 74-77.

Uses of greases, oils, solvents, plastics, and their advantages and disadvantages for specific situations.

7a-12. The Metalizing Process. Rick Mansell. *Steel Processing,* v. 33, Dec. 1947, p. 742-745, 765.

Development of the process; preliminary surface preparation methods; the process itself.

7a-13. Finish Application Table. Zola Fox. *Product Engineering,* v. 19, Jan. 1948, p. 161.

Intended as a guide in the selection of proper finishes for the most commonly used ferrous and nonferrous metals, as applied in machine design. Includes electroplating and electrofinishing processes.

7a-14. 1947 Progress in Metal Finishing. Walter A. Raymond. *Metal Finishing,* v. 46, Jan. 1948, p. 56-60.

A review. 74 ref.

7a-15. Tin Coatings on Metals. Frederick W. Bogert. *Metal Finishing,* v. 46, Jan. 1948, p. 68-71.

Historical and descriptive.

7a-16. Finishing Small Electric Appliances. Gerald Eldridge Stedman. *Metal Finishing,* v. 46, Jan. 1948, p. 78-80.

Equipment and procedures in production of miscellaneous appliances.

7a-17. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, Jan. 1948, p. 54, 56, 58, 60, 62, 66, 68, 70, 72, 74.

Strippable plastic coating for surface finishes; testing surface preparation; selection and application of primer in finishing aluminum; barrel nickel and chromium plating; chemical treatment for improving corrosion resistance of tin-plated steel.

7a-18. Barrel Finishing of Metal Products. Part 17. H. Leroy Beaver. *Products Finishing,* v. 12, Jan. 1948, p. 76-78, 80, 82, 84.

The development of finishing materials used in barrels. (To be continued.)

7a-19. New Type Tank Expedites Plastic Dipping Operations. *Iron Age,* v. 161, Jan. 15, 1948, p. 72.

New tank manufactured by Lindberg Engineering Co. results in much more even heat distribution within the plastic mass, which is applied by dip coating. The impeller-type agitator, the heating element, and the heat-dispersal unit contribute to reducing melting time from 6 or 8 hr. to less than 2 hr.

7a-20. Wrinkle Finishes—25 Control Points. E. A. Zahn. *Iron Age,* v. 161, Jan. 15, 1948, p. 78-83.

25 specific factors can have a marked effect upon the finish regardless of its type or texture; methods for controlling them.

7a-21. Electrolytic Resistance in Evaluating Protective Merit of Coatings on Metals. R. Charles Bacon, Joseph J. Smith, and Frank M. Rugg. *Industrial and Engineering Chemistry,* v. 40, Jan. 1948, p. 161-167.

By examination of over 300 test systems the electrolytic resistance was found to be reliable for following protective behavior and for predicting coating life, generally, in less than one fifth the time required by the usual exposure tests based on visual observation.

7a-22. Automatic Spray Booth With Two Separate Paint Circulating Systems. *Machinery,* v. 54, Jan. 1948, p. 192-193.

System employed in painting axle assemblies permits immediate shift from one coating to another.

7a-23. Production Costs Halved by Power-Brush Cleaning. *Steel,* v. 122, Jan. 19, 1948, p. 78.

Oil, grease, and dirt removal from automobile and truck clutch plates.

7a-24. Centrifugal-Force Finishing. George Cavanaugh. *Steel,* v. 122, Jan. 19, 1948, p. 95.

Pressure flow coating, followed by high-speed whirling for removal of excess paint, is proving to be an efficient, economical method of production finishing the small, gas-filled bellows used in many industrial control devices.

7a-25. Molybdenum and Tungsten Coatings. *Engineer,* v. 184, Dec. 26, 1947, p. 601.

Critically reviews recent papers on formation of coatings by dissociation of carbonyl compounds of the metals and deposition of the resulting metallic vapor.

7a-26. The Field and Functions of Flame Spraying. H. W. Greenwood. *Machinery Lloyd* (Overseas Edition), v. 20, Jan. 3, 1948, p. 79-81.

Applications.

7a-27. Metal Polishing. E. J. Wright. *Plating,* v. 35, Jan. 1948, p. 35-37, 98.

Various methods for mechanical polishing; steps for increasing productivity. Conditions existing in Australia.

7a-28. Finishing National Cash Registers. M. W. St. John. *Industrial Finishing,* v. 24, Dec. 1947, p. 62-64, 66.

Cleaning of all metal surfaces, bonderizing, rinsing, drying, prime coating, spot puttying, sanding, second priming, graining, top coating, baking top coats, and application of decalcomanias. (To be continued.)

7a-29. New Synthetic Finish for Ferrous and Nonferrous Metals. Carl L. Shapiro. *Materials & Methods,* v. 27, Jan. 1948, p. 62-64.

Chemical pretreatments and primer coats can be eliminated in finishing metals by use of a new vinyl-type coating which dries in from 2 to 20 min. at 300° F.

7a-30. Product Painting in a Custom Shop. C. F. Swanson. *Industrial Finishing,* v. 24, Jan. 1948, p. 58-60, 62, 64, 66.

Layout and operation of equipment for finishing diversified products.

7a-31. Review of Organic Finishing—1947. Ferdinand C. Wehrman. *Organic Finishing,* v. 9, Jan. 1948, p. 9, 12-13, 16-17.

7a-32. Advances in Cleaning Compounds. D. R. Swan. *Organic Finishing,* v. 9, Jan. 1948, p. 19-25.

Developments in chemical cleaners for metal surfaces.

7a-33. Wrinkle Finishes Applied Electrostatically. Herbert Chase. *Organic Finishing,* v. 9, Jan. 1948, p. 33, 36-37.

Finishing of metal products at International Business Machines Corp., especially in applying a black wrinkle finish by means of an electrostatic spray set-up.

7a-34. Modern Methods in Paint Spray Booth Practice. *Sheet Metal Worker,* v. 39, Jan. 1948, p. 99-100, 109.

7a-35. Aircraft Finishes. R. J. Ledwith. *Journal of the Oil & Colour Chemists' Association,* v. 30, Dec. 1947, p. 503-515; discussion, p. 515-518.

The special characteristics of aircraft finishes. The principal D.T.D. specification finishes for the materials used in aircraft construction, namely wood, fabric, and metal. An evaluation of performance in meeting these requirements and the limitations of specifications. Recent developments.

7a-36. The Assessment of Ships' Paints for Use in the Royal Navy. C. D. Lawrence and G. E. Gale. *Journal of the Oil & Colour Chemists' Association,* v. 30, Dec. 1947, p. 519-548; discussion, p. 549-556.

Anticorrosive and antifouling paints for ships' bottoms; weatherwork and camouflage paints; fire-retardant paints; deck paints; anticondensation paints for use under humid conditions. 17 ref.

7a-37. Powder Welding. Clyde B. Clason. *Welding Engineer,* v. 33, Feb. 1948, p. 60, 62.

Use of two separate gases to project powdered metals, rubbers, enamels, and other materials under cover of controlled atmospheres of any type desired. The process may be applied to flame spraying of metals and nonmetallics with compressed air; powder welding by controlled atmosphere projection; nonpowder welding in a controlled atmosphere; and brazing and soldering in a controlled atmosphere.

7a-38. Hazard Survey of a High-Voltage Electrostatic Process for Spray-Deposition and Dip-Detearing of Paints. *National Board of Fire Underwriters, Research Report* No. 6, 1947, 40 pages.

Theory of operation of the process, design and construction of the equipment used; layout and installation of typical assemblies. A review of the ordinary and special hazards involved in the spraying and detearing arrangements, and a resume of existing codes and precautionary measures. 39 ref.

7a-39. The Cleaning of Metals—II. Alkaline Cleaners. R. Groves. *Metallurgia,* v. 37, Dec. 1947, p. 100-102.

Principal applications; specific operations; procedural details.

7a-40. Metal Conservation in Europe; Progress of Phosphating. *Metallurgia,* v. 37, Dec. 1947, p. 105-106.

A brief review.

7a-41. Beneficiation of Over-Spray Porcelain Enamel. (Concluded.) Donald W. Scott, L. A. Roe and B. J. Sweo. *Ceramic Age,* v. 51, Jan. 1948, p. 18-19, 27.

Previously abstracted from *Mining Technology,* v. 11, Sept. 1947, T.P. 2253. See item 7-405, R.M.L., v. 4, 1947.

7a-42. Preservation of Grained Plates. Robert E. Rossell. *Modern Lithography,* v. 16, Jan. 1948, p. 49, 91, 93, 95, 97, 99.

Tropical and sub-arctic testing of lithographic equipment, supplies, and processes by the Photo & Lithographic Branch of the Engineer Research and Development Laboratories. In addition to the testing of preservative coatings on both zinc and aluminum plates, a description of the tropical testing chamber is also given.

7a-43. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, Feb. 1948, p. 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64.

Reviews the following: Organic Coatings for Corrosion Protection,

by George W. Seagren at 3rd Annual Symposium on Modern Metal Protection; Sources of Impurities in Plating Solutions, by Myron B. Diggin in *Monthly Review*, Nov. 1947; Addition of Alumina to Porcelain-Enamel Frits to Improve High-Temperature Corrosion Resistance, by W. N. Harrison at 3rd Annual Symposium on Modern Metal Protection; and Electrographic Printing of Pores in Protective Coatings (A Method for Evaluating Porosity) described by W. E. Shaw and E. T. Moore, *Analytical Chemistry*, Oct. 1947.

7a-44. Barrel Finishing of Metal Products. Part 18—Continuation of the Discussion of the Origin of Finishing Materials Used in Barrels. H. Leroy Beaver. *Products Finishing*, v. 12, Feb. 1948, p. 70, 72, 74, 76, 78, 80, 82.

7a-45. Stripping of Rhodium Plating. M. Shapiro. *Metal Finishing*, v. 46, Feb. 1948, p. 56-58, 64.

Two methods that have been developed to remove rhodium plate from nickel-plated brass or copper.

7a-46. The Cleaning of Metals. Part III—Further Operations. R. Groves. *Metallurgia*, v. 37, Jan. 1948, p. 147-149.

Cleaning buffed and polished parts for electroplating. Degreasing solvents, their advantages and drawbacks; cleaning by petroleum distillates.

7a-47. Elastic Properties of Paint Films for Metals. S. Conolly. *Metal Treatment*, v. 14, Winter 1947-48, p. 222-226.

Results of experimental work on the elastic properties of paint films detached from specially prepared metal surfaces. Effects of modification of the drying oils, pigmentation, and incorporation of resin.

7a-48. Clear Coatings With Rust Preventive Properties. Helen Sellei and Eugene Lieber. *Corrosion and Material Protection*, v. 5, Jan.-Feb. 1948, p. 10-12, 22.

Background and initial development of transparent and readily removable coatings for use in packaging and storage of metallic parts and equipment.

7a-49. Surface Treatment for Metal Before Painting. Arthur P. Schulze. *Industrial Finishing*, v. 24, Feb. 1948, p. 48, 52, 54, 56, 61-62, 64, 66.

The various methods.

7a-50. Coated Abrasives. *Materials & Methods*, v. 27, Feb. 1948, p. 105, 107.

Tabulates properties and applications.

7a-51. Interior Coating of Tubular Containers. L. P. Hubbuch and W. C. Johnson. *Industrial and Engineering Chemistry*, v. 40, Feb. 1948, p. 297-301.

The coating of the interiors of containers for certain poison gases was studied. Coatings based on straight 100% phenol formaldehyde resins were found resistant enough to prevent the decomposition of the gases which occurs when they are stored in contact with iron or steel. A modified dip method was worked out to provide uniform, thin, continuous coatings.

7a-52. Protective Coatings. R. M. Burns. *Metal Progress*, v. 53, Feb. 1948, p. 276, 278-279.

Summarizes two talks by the author given at Western Metal Congress, Oakland, Calif. March 1947. Fundamentals of corrosion and use of both metallic and non-metallic coatings for metals.

7a-53. Electroless Plating on Metals by Chemical Reduction. *Electroplating*, v. 1, Feb. 1948, p. 149-150. Reprinted from *Products Finishing*, Sept. 1947.

Previously abstracted from above source. See item 7-364, R.M.L., v 4, 1947.

7a-54. Brushing Machine Cuts Cleaning Operations. *Automotive Industries*, v. 98, Feb. 15, 1948, p. 45.

50% reduction in production costs is claimed for use of a new semi-automatic power brushing machine for removing oil, grease and dirt from automobile and truck clutch plates just prior to final inspection.

7a-55. Preparing Surfaces for Metalizing. Rick Mansell. *Steel*, v. 122, March 1, 1948, p. 93-95, 119, 122, 125.

Use of blasting, rough-threading, or electric bonding methods to clean and roughen surfaces before metal spraying.

7a-56. The Sodium Hydride Process and New Method of Descaling Metals; Application to Wire and Strip. N. L. Evans. *Wire Industry*, v. 15, Feb. 1948, p. 105-107.

The process and equipment necessary, the method of constructing it, and the manner of its operation for wire and metals in other forms.

7a-57. Health Hazards of Metal Cleaning Compounds. Part III. P. M. Van Arsdell. *Organic Finishing*, v. 9, Feb. 1948, p. 18-28, 32.

Halogenated hydrocarbons; methylene dichloride; chloroform; carbon tetrachloride; dichlorethylene; trichlorethylene; tetrachlorethylene; and miscellaneous solvents. 75 ref.

7a-58. Protection for Polished Metal Sheets. *Plastics* (London), v. 12, Feb. 1948, p. 59.

Describes "Birlon", a strippable plastic-film coating developed in Britain.

7a-59. Developments in Shotblasting. R. Ankers. *Foundry Trade Journal,* v. 84, Feb. 12, 1948, p. 151-154.

Mechanical impact blasting, shot peening, and liquid honing.

7a-60. The Vapor Blast Liquid Honing Process. R. Ankers. *Machinery* (London), v. 72, Feb. 12, 1948, p. 214.

(Condensed from paper presented to Manchester Association of Engineers.)

7a-61. Cleaning Surfaces by Nonerosive Blasting. Joseph Albin. *Metal Finishing,* v. 46, March 1948, p. 54-56, 61.

This method of cleaning, also known as seed or soft-grit blasting, promises interesting applications in the metal-finishing field. Describes its use in airlines maintenance for cleaning engine parts without causing abrasion of critical surfaces. Details of production methods, economy, and flexibility of the process.

7a-62. Finishing Metals by "Liquid Honing". Charles H. Wick. *Machinery,* v. 54, March 1948, p. 158-161.

Use of abrasive suspended in a water-chemical solution and discharged from a nozzle by compressed air. Some remarkable increases in the life of cutting tools, molds, and dies have been obtained in this way.

7a-63. Selection of Protective Coatings for Metals. K. G. Compton. *Corrosion,* v. 4, March 1948, p. 112-122.

The various types, including metallic, organic, inorganic, and temporary, and their subdivisions. Descriptions of various test methods. (Presented at Symposium on Modern Metal Protection, Cleveland, Sept. 1, 1947.)

7a-64. Vertical Conveying System Saves Floor Space in Paint Baking Operations. *Steel,* v. 122, March 15, 1948, p. 111.

7a-65. Metal Cleaning Processes—I. Factors Determining Methods and Materials. L. Sanderson. *Chemical Age,* v. 58, Feb. 7, 1948, p. 205-206, 208.

(To be continued.)

7a-66. Deposition of Nickel and Cobalt by Chemical Reduction. Abner Brenner and Grace Riddell. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 156-169; discussion; p. 169-170.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 7-501, R.M.L., v. 4, 1947.

7a-67. Some Properties of Aluminum Flake Powders. Part 2. Gunter W. Wendon. *Paint Manufacture,* v. 18, Feb. 1948, p. 45-47.

Properties which are connected with color, including dyed powders, and use of aluminum flake in polychromatic paints.

7a-68. Barrel Finishing of Metal Products. Part 19—The Use of Wood-Lined Barrels for Abrasive Operation and the Relation of Barrel Size to Size of Parts to Be Processed. H. Leroy Beaver. *Products Finishing,* v. 12, March 1948, p. 50, 52, 54, 56, 58, 60, 62.

7a-69. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, March 1948, p. 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94.

New methods for treatment of plating-room wastes; protective metallic coatings from salt baths; new instrument for measuring flexibility and adhesion of surface coatings; surface preparation before painting exterior steel surfaces.

7a-70. Cleaning Small Parts. John E. Hyler. *Products Finishing,* v. 12, March 1948, p. 96, 98.

Use of basket immersion and air drying.

7a-71. Chromated Protein Films for the Protection of Metals. Abner Brenner, Grace Riddell, and Robert Seegmiller. *Journal of the Electrochemical Society,* v. 93. March 1948, p. 55-62.

Process developed for protecting steel, zinc, aluminum, and brass from corrosion. Either casein, albumin, or gelatin is applied to the metal surface by dipping. The film is impregnated with chromate, which acts as an inhibitor of corrosion and hardens the film, by adding the salt to the protein solution or by separate immersion. These films may be useful for the protection of certain metals in mildly corrosive atmospheres. (To be presented at meeting of the Society, Columbus, Ohio, April 14-17, 1948,)

7a-72. Handling Rush Jobs in a Custom Shop. G. A. Conrad. *Industrial Finishing,* v. 24, March 1948, p. 50-52, 57.

Tips in metal finishing field.

7a-73. Cleaning, Bonderizing and Prime Coating Automobile Wheels. Fred M. Burt. *Industrial Finishing,* v. 24, March 1948, p. 58-59, 62, 64, 66.

Operation of a practical mechanized setup for cleaning, rust-proofing and painting automobile wheels—a setup which is applicable to other metal parts and products.

7a-74. Flow-Coating of Farm Machinery. Norman H. Voigt. *Industrial Fin-*

ishing, v. 24, March 1948, p. 67, 70-71, 74, 76.

Use of flow-coat system for painting certain types of heavy farm and road-building machinery. Composed of angle iron, rods, springs sprockets and brackets, these huge machines are a complex array of heterogeneous parts. This fact makes either a dipping or flow-coat system almost mandatory.

7a-75. Health Hazards of Metal Cleaning Compounds. Part IV. P. M. Van Arsdell. *Organic Finishing,* v. 9, March 1948, p. 38-43.

Chlorinated solvents. 29 ref.

7a-76. Engraving Conical Metal Surfaces; A Chemical Etching Process. E. W. Jackson. *British Printer,* v. 60, March-April 1948, p. 20-23.

Method developed for engraving families of nonlinear curves on the above, which are required for various artillery-firing-control instruments. A modified letterpress printing process using a rubber printing surface and a simple hand-driven machine of special design.

7a-77. Molten Salt Bath Descaling Provides Greater Metal Savings. *Steel,* v. 122, March 29, 1948, p. 90.

How the problem of scale removal from hot-rolled clad plate and sheet, including stainless, nickel, and monel, was solved.

7a-78. New Development in Metallizing. *Industry and Welding,* v. 21, April 1948, p. 60-61.

Method involves use of a metal in wire form which may be sprayed with any metallizing gun directly on to smooth steel and many other materials without any surface preparation.

7a-79. The Cleaning of Metals. Part IV —Emulsifiable Cleaners. Part V—The Cleaning Machines. (Concluded.) R. Groves. *Metallurgia,* v. 37, Feb. 1948, p. 217-219; March 1948, p. 267-268.

7a-80. Metal Spraying by the Wire Process. W. E. Ballard. *Journal of the Birmingham Metallurgical Society,* v. 28, March 1948, p. 37-50; discussion, p. 51-61.

Describes above process. Includes sound-film script on the subject.

7a-81. Barrel Finishing for Mass Production. Herbert Chase. *Metal Finishing,* v. 46, April 1948, p. 56-60.

Use at Endicott, N. Y., plant of IBM for some 8500 different parts ranging from gray-iron castings about 2½ x 4 x 14 in. overall and weighing about 6 lbs., to tiny parts weighing a small fraction of an ounce. Zinc die castings, steel forgings, scores of screw-machine products, hundreds of stampings in steel, brass, and aluminum, and a wide assortment of other products are regularly subjected to surface treatment in barrels of many sizes and types.

7a-82. Methods of Evaluation of Industrial Finishes. R. A. Pringle and E. M. Yacko. *Paint and Varnish Production Manager,* v. 28, April 1948, p. 108, 110-113.

Procedure used in testing and evaluating organic finishes to be used on appliances.

7a-83. Roto-Finish Spurs Finishing Economies. Arthur P. Schulze. *Tool Engineer,* v. 20, April 1948, p. 35-37.

Recently developed technique is a versatile barrel-finishing process which makes possible four basic types of mechanical finishing: grinding for deburring; polishing; "britehoning"; and wet coloring using steel balls of various sizes or suitable coloring media. Consists essentially of using specified wet mixtures of chips and compounds in controlled rotary action for a variety of finishing jobs.

7a-84. Glycerine in Finishes for Metal Products. Georgia Leffingwell and Milton A. Lesser. *Products Finishing,* v. 12, April 1948, p. 46, 48, 50, 52, 54.

A review. 28 ref.

7a-85. Barrel Finishing of Metal Products. Part 20—Continuing the Discussion of the Use of Pebble and Fractured Mineral Forms in Barrel Finishing Procedure. H. Leroy Beaver. *Products Finishing* v. 12, April 1948, p. 58-60, 62, 64, 66, 68.

7a-86. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, April 1948, p. 74, 76, 78, 80, 82, 84, 86, 88, 90, 92.

The following new developments: phenolic-resin coatings baked by induction heating; electropolishing of silver; importance of proper rinsing following alkali cleaning operations; synthetic rubber derivatives as corrosion-resistant coatings; and anodic coating for magnesium.

7a-87. Conveyorized Infrared Equipment Improves Production and Quality at Allen. *Products Finishing,* v.12, April 1948, p. 94, 96, 98.

Use in finishing bookkeeping machines, adding machines, calculators, and cash registers.

7a-88. Plastic Coating Protects Chromium Plated Parts During Assembly. *Products Finishing,* v. 12, April 1948, p. 98.

Use during spray painting.

7a-89. Organic Coatings for Metals. E. E. McSweeney. *Plating,* v. 35, April 1948, p. 340-343.

Composition in relation to performance, various factors which should be considered in selecting a coating for a specific application, including the cost item, wherein cost per finished article is said to be more important than cost per gallon.

7a-90. Stripping of Electrodeposits. Norman D. Hoffman. *Plating,* v. 35, April 1948, p. 351-352, 404.

Immersion and electrolytic types of stripping processes and recommended procedures for the various plated and base metals, with consideration of other factors as well.

7a-91. Some Recent Developments in Synthetic Resins for Protective Coatings. L. R. Whiting. *American Paint Journal,* v. 32, April 19, 1948, p. 72, 74, 76-79, 82.

Studies and results obtained in an attempt to produce a coating that would serve both as an inhibitive wash coat and a temporary anticorrosive primer. Also briefly describes an instrument, the "Protectometer", for evaluating protective films on metal in various environments.

7a-92. Radiant Heat; The "Rapiradia" Car Stoving System. *Automobile Engineer,* v. 38, Jan. 1948 p. 14.

System for baking finishes on automobile bodies.

7a-93. Painting Diversified Metal Products. K. E. Williams. *Industrial Finishing,* v. 24, April 1948, p. 42-44, 46, 48, 50, 52.

Surface treatment before painting and the technique of applying different finishes to space and water heater, oil burners, and car loaders.

7a-94. Finishing for Wringer Components of Washing Machines. Walter Rudolph. *Industrial Finishing,* v. 24, April 1948, p. 64-66, 70, 72, 74.

Use of two conveyer lines, each taking care of a different kind of finishing setup—one for applying and drying a dip coat of clear lacquer, and the other to spray a coat of white enamel.

7a-95. A Finishing Process—Coating With Flock. C. C. Fairweather. *Industrial Finishing,* v. 24, April 1948, p. 79-80, 82, 84.

Process produces colorful velvet and suede-like coatings of various types on miscellaneous products in wood, metal, glass, and paper.

7a-96. The Fusibility and Expansion Coefficient of Glass. J. M. Stevels. *Sheet Metal Industries,* v. 25, April 1948, p. 759-765.

Deals in a fundamental manner with fusibility and expansion properties of glasses or vitreous enamels which are of importance to the practical enameler. The arrangement of the atoms in crystal structures found in glasses.

7a-97. Metal Cleaning Processes—Part III. Varying Treatments for Special Needs. L. Sanderson. *Chemical Age,* v. 58, April 3, 1948, p. 459-461.

7a-98. Printing Replaces Hand Filling of Embossed Surfaces. H. O. Bates. *American Machinist,* v. 92, April 22, 1948, p. 89.

Replacement of costly hand application of enamel to embossed work by use of a molded synthetic-rubber die.

7a-99. The Deposition of Pure Boron. Part I. A Static Method for the Preparation of Boron Coatings. H. I. Schlesinger, George W. Schaeffer, and Glen D. Barbaras. *U. S. Atomic Energy Commission,* MDDC-1338, May 24, 1944, 26 pages.

The procedure most frequently used by the authors consisted of heating the object to be coated in a static atmosphere of diborane. By repetition, deposits of the required thicknesses were obtained. Deposition occurs at temperatures between 400 and 600° C. It can be easily adapted to large-scale operations. Deposits can be obtained on glass, Al, Fe, Cr, Ag, Ta, Mo, Pt, W, as well as on the alloys chromel, alumel, and constantan; and may be any desired thickness up to 10 mils. 19 ref.

7a-100. An Analysis of the Polishing Problem. W. H. Sawyer. *Journal of the Electrodepositors' Technical Society,* v. 23, 1948, p. 59-78 (Reprint.)

"The polishing problem" lies not only in the polishing shop but is affected by each successive stage of fabrication. Problems of design, in the foundry, in forging, in ingot casting, in rolling, in the press shop, in machining, in soldering and brazing, and in plating, in relation to effects on the polishing operation. (Presented at Annual Conference, The Society, Birmingham, England, April 15, 1948.)

7a-101. Methods and Technique of Automatic Polishing. H. C. Clements. *Journal of the Electrodepositors Technical Society,* v. 23, 1948, p. 79-90. (Reprint.)

Various types of machines for automatic polishing. (To be presented at Annual Conference, The Society, Birmingham, England, April 15, 1948.)

7a-102. A Review of Metal Polishing. L. Mable. *Journal of the Electrode-*

positors' Technical Society, v. 23, 1948, p. 91-94. (Reprint.)

(Presented at annual conference. The Society, Birmingham, England, April 15, 1948.)

7a-103. Metal Spraying and Industrial Economy. H. W. Greenwood. *Engineers' Digest* (American Edition), v. 5, April-March 1948, p. 102.

A condensation. Previously published in *Metallurgia,* v. 37, Dec. 1947, p. 60.

7a-104. Metal Surface Protection by Tin Diffusion. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 155-156. Translated and abstracted from *Metalloberflache,* v. 1, Aug. 1947, p. 185-187.

Procedure developed and results obtained. It can be applied to copper, copper alloys, and steel. Investigations in German shipyards have proved the good corrosion resistance of the protective layer and its applicability to high-pressure work.

7a-105. Stainless Steel Paint Offers Corrosion Resistance, Hardness and Attractive Surface. George Black. *Materials & Methods,* v. 27, April 1948, p. 86-87.

Use of stainless steel in flake or paste form under corrosive conditions and as a finish for products which must withstand constant exposure.

7a-106. Decals: A Finishing Touch. Alphonse Bihr. *Die Castings,* v. 6, May 1948, p. 65-68.

Decorative, advertising, and identification use on die castings. Types of decals, methods of application, costs, and other factors.

7a-107. Evaluating the Ideal Industrial Instrument Finish. A. H. Keyser. *Product Engineering,* v. 19, May 1948, p. 134-137.

Characteristics required, tests for abrasion resistance, shear hardness, adhesion, appearance, humidity, and results of water immersion. Effect of gloss, drying cycle, and color on the selection.

7a-108. Flame Spraying of Dust Extraction and Ventilation Plant. H. W. Greenwood. *Sheet Metal Industries,* v. 25, April 1948, p. 975-976.

Flame spraying of metals or plastics to provide coatings for ventilating-system ductwork.

7a-109. Surface Preparation: Preparation of Metals for Organic Finishing. Walter R. Meyer. *Organic Finishing,* v. 9, April 1948, p. 12-17.

Methods of cleaning; scale and oxide removal; surface-preparational processes; and specific treatments for steel, aluminum, magnesium, zinc and copper, and brass.

7a-110. Phosphate Treatments for Metals. Walter A. Raymond. *Organic Finishing,* v. 9, April 1948, p. 19, 21-25.

Methods and applications.

7a-111. Surface Preparation as a Measure of Preventing Corrosion. E. Davenport. *Organic Finishing,* v. 9, April 1948, p. 25-27.

Mechanical and chemical methods.

7a-112. Selecting the Right Abrasive Wheel for Portable Power Tools. Van Cunningham. *Organic Finishing,* v. 9, April 1948, p. 27-29.

Recommendations.

7a-113. The Principles of Solvent Vapor Degreasing. G. W. Walter. *Organic Finishing,* v. 9, April 1948, p. 29-37.

7a-114. Finishing Materials; Properties of Synthetic Coatings. F. L. Scott. *Organic Finishing,* v. 9, April 1948, p. 39, 41, 43-47.

7a-115. Electrostatic Spraying Process. Emery P. Miller. *Organic Finishing,* v. 9, April 1948, p. 136-139, 142.

Practical features.

7a-116. Infrared for Finishing. *Organic Finishing,* v. 9, April 1948, p. 150-154.

Advantages, applications, costs, methods, equipment.

7a-117. Organic Coatings for Corrosion Protection; A General Discussion. G. W. Seagren. *Corrosion,* v. 4, May 1948, p. 219-226.

(Presented at Symposium on Modern Metal Protection, Cleveland, Sept. 27, 1947.)

7a-118. Stripping of Copper. Part IV. The Sodium Polysulphide Sodium Cyanide Method. F. C. Mathers and E. L. Martin. *Plating,* v. 35, May 1948, p. 463-464.

Report published in the Sept. 1946 issue of *Monthly Review,* covered the use of calcium polysulphide and sodium cyanide for stripping of copper. This report covers the extension of this work to include the use of sodium polysulphide and its application to Zn-base die castings.

7a-119. Polythene and Plating. *Electroplating,* v. 1, May 1948, p. 302-308, 346.

A "plastic" material. Its use in lining of plating and pickling vats and in the coating of those portions of racks and jigs which are not to receive an electrodeposit.

7a-120. Don't Overlook Small Savings. Mark G. Simpson. *Western Machinery and Steel World,* v. 39, May 1948, p. 81-83.

Unique tumbling-barrel design and special neoprene deburring com-

pound. Greater efficiency in the deburring of small metal parts is claimed for the combination.

7a-121. Different Finishes on the Same Conveyer Setup. A. J. Berna. *Industrial Finishing,* v. 24, May 1948, p. 66-68 70.

A 3-in-1 conveyer is used to move wood and metal parts through one spray booth and oven. Some parts receive three coats, some two coats, and some only one.

7a-122. Metal Cleaning Processes. Part IV. Solutions, Safeguards and Equipment. L. Sanderson. *Chemical Age,* v. 58, May 1, 1948, p. 613-615.

7a-123. Printing Replaces Hand Filling of Embossed Surfaces. H. O. Bates. *American Machinist,* v. 92, May 20, 1948, p. 109.

Corrected version of article which appeared in April 22 issue. See item 7a-98, 1948.

7a-124. Polishing—Its Role in the Metal Finishing Industry. W. L. Pinner. *Journal of the Electrodepositors' Technical Society,* v. 23, 1948, p. 95-100. (Reprint.)

Mechanical polishing as applied to the preparation of steel parts which are to receive a decorative coating of nickel and chromium plate.

7a-125. Organic Finishes for Metal Products. *Steel,* v. 122, May 17, 1948, p. 77-82; May 31, 1948, p. 56-59, 90; June 14, 1948, p. 96-98, 100, 102, 104.

1. Choice of the proper coating, application and baking methods, and metal-preparation techniques. 2. Methods of cleaning and preparing surfaces prior to painting, and to formation of phosphate coatings on steel. 3. Preparation for painting, including ways to determine whether or not a surface is clean. (To be continued.)

7a-126. An Investigation Into the Adhesion of Paint to Metal Surfaces. S. C. Britton. *Sheet Metal Industries,* v. 25. June 1948, p. 1185-1190, 1194.

Practical methods of improving adhesion, methods of determining adhesion in general use, and a method giving numerical results which is limited to effects of surface roughening treatments.

7a-127. Refractory Ceramic Base Coats for Metal. W. J. Plankenhorn. *Journal of the American Ceramic Society,* v. 31, June 1948, p. 145-153.

Formulation and development for application to ingot iron, low-carbon steel, and alloy metals. Tests for evaluation of the coatings and a summary of results. Metal preparation and procedures and results of service tests.

7a-128. Metal Cleaning. *Metal Finishing,* v. 46, June 1948, p. 113.

Table summarizes each of the more widely used techniques for cleaning metals prior to electroplating.

7a-129. Continuous Bonderizing Doubles Output. J. W. Lynch. *American Machinist,* v. 92, June 3, 1948, p. 87.

For finishing of electrical household appliances and lawn sprinklers requiring a number of steel stampings, and also painted aluminum and zinc die castings.

7a-130. Measurement of Adherence of Organic Coatings to Metal Surfaces. Henry Green and Theresa P. Lamattina. *Analytical Chemistry,* v. 20, June 15, 1948, p. 523-527.

An apparatus of the knife type, which cuts and pushes off a strip of coating of substantial width. The force necessary to do this is calculated in dynes and divided by the strip width to give a ratio called the stripping force per unit width. When this value is divided by the film thickness, the result is called the intrinsic stripping force.

7a-131. Sandstrahlbehandlung metallischer Oberflächen. (Finishing of Metal Surfaces by Sandblasting.) Fritz Wehrmann. *Metalloberfläche,* v. 1, March 1947, p. 56-57.

Design factors for sandblast equipment. Advantages of this method.

7a-132. Health Hazards of Metal Cleaning Compounds. (Concluded.) P. M. Van Arsdell. *Organic Finishing,* v. 9, May 1948, p. 20-25.

Toxicity of various alcohols, sulphonates, aniline, and miscellaneous organic and inorganic compounds.

7a-133. Painting Transformers. Walter Rudolph. *Organic Finishing,* v. 9, May 1948, p. 36-40.

Conveyerization of cleaning, bonderizing, and painting operations in making transformers.

7a-134. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, June 1948, p. 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72.

Thickness measurements of plated coatings; coverage tests of finishing materials; spot test for detection of cadmium plate; nitrocellulose lacquers as finishing materials; and slot plating test cell.

7a-135. Barrel Finishing of Metal Products. Part 22. A Further Discussion of the Use of Minerals in Barrel Finishing Processes. H. Leroy Beaver. *Products Finishing,* v. 12, June 1948, p. 78, 80, 82, 84, 86.

7a-136. Practical Applications of Modern Products. *Products Finishing,* v.

12, June 1948, p. 88, 90, 92, 94, 96, 98.
Automatic buffing machine speeds finishing operations; Dow process for plating on magnesium; and acid resisting enamel range tops produced with one coat of porcelain enamel.

7a-137. Technique of Applying Attractive Finishes on Prefabricated Metal Partitions. H. W. Sacks. *Industrial Finishing,* v. 24, June 1948, p. 59, 62, 64, 67-68.
How mass-production finishing is accomplished in a custom shop.

7a-138. Metal-Coated Plastics Combine Advantages of Both Materials. H. R. Clauser. *Materials & Methods,* v. 27, June 1948, p. 79-82.
Metal coatings, applied by electroplating, vacuum deposition, and metal spraying provide special combinations of properties to meet both engineering and decorative needs.

7a-139. Polishing; Its Role in the Metal-Finishing Industry. W. L. Pinner. *Metal Industry,* v. 72, June 4, 1948, p. 460-462.
Previously abstracted from *Journal of the Electrodepositors' Technical Society,* v. 23, 1948, p. 95-100 (Reprint). See item 7a-124, 1948.

7a-140. Porcelain Enamel Versus Corrosion. Helen H. Smith, *Corrosion and Material Protection,* v. 5, May-June 1948, p. 8-9, 16.
Applications for chemical reactors and other industrial equipment exposed to severe corrosion.

7a-141. Polychrome Metallic Finishes. George Black. *Organic Finishing,* v. 9, June 1948, p. 11-15, 51.
Smooth and "textured" classes of organic coatings in which colors vary depending upon diffraction and reflection of light rays. This phenomenon is made possible by use of aluminum or aluminum-bronze flakes in the pigment composition.

7a-142. Progress of Fluxing in Hot Galvanizing. A. T. Baldwin. *Canadian Metals & Metallurgical Industries,* v. 11, June 1948, p. 23, 38.
Use of zinc ammonium chloride and nonaqueous fluxes. Factors to consider in a fluxing process.

7a-143. Advancements in Refrigerator Finishes. O. E. Norberg. *Refrigerating Engineering,* v. 55, June, 1948, p. 567-570; discussion, p. 570, 604-605.
Development of improved surface coatings and methods for their testing.

7a-144. Cleaning and Finishing. Arch B. Tripler, Jr. *Metals Review,* v. 21, June 1948, p. 3, 5, 7.
Past year's developments in cleaning, pickling, metal coatings, barrel finishing, polishing, buffing, grinding, anodizing, and coloring, with references to "A.S.M. Review of Current Metal Literature."

7a-145. Finishing Equipment. *Metals Review,* v. 21, June 1948, p. 9, 11, 13, 15, 17, 19, 21.
New products for metal cleaning, polishing, protective coating, and electroplating announced during the past year, as described by the manufacturers.

7a-146. Investigation of Spalling of Porcelain Enamel Caused by Syrup at Elevated Temperatures. E. D. Skillicorn. *Enamelist,* v. 25, June 1948, p. 9-13.
Spalling was investigated on a laboratory scale using test panels to simulate the service conditions which resulted in severe spalling in a heavy-duty oven used in a cafeteria when hot cherry juice was spilled on it. Data for five base metals, including copper, and 22 types of enamel.

7a-147. Metal Cleaning Processes. (Concluded.) **V. Tanks, Sprays and Electrical Processes.** L. Sanderson. *Chemical Age,* v. 58, June 5, 1948, p. 779-780, 788.

7a-148. Diphase Metal Cleaners; Preferential Wetting by the Two Phases. Irving Reich and Foster Dee Snell. *Industrial and Engineering Chemistry,* v. 40, July 1948, p. 1233-1237.
Details of theoretical and experimental study of the surface action including: mechanism of wetting; interfacial angles for various systems; oil displacements by aqueous solutions; effects of soaps; effect of oleic acid; effects of soil type; and role of the surface.

7a-149. How to Paint the Product. Part I. H. E. Linsley. *American Machinist,* v. 92, July 15, 1948, p. 97-112.
First part of a two-part manual deals with preparing the surface of the various metals for painting; selecting and preparing the paint; and conventional and electrostatic spray painting. (To be concluded.)

7a-150. Vinyl Polymers in Surface face Coatings. C. W. Patton. *Official Digest,* March 1948, p. 267-279.
Properties, compositions, and application to metal and other surfaces. Formulations and application techniques.

7a-151. Metal Surfaces—Their Preparation and Painting. G. Diehlman, A. J. Eickhoff, and J. G. Wills. *Official Digest,* May 1948, p. 357-367.
The various methods used for iron and steel, zinc (galvanized iron), and aluminum and its alloys, 13 ref.

7a-152. Industrial Finishes and Finishing. F. G. Weed and N. P. Beckwith. *Official Digest,* May 1948, p. 383-399.
Materials and methods used in the protective and decorative coating of common industrial products.

7a-153. Organic Finishes for Metal Products. (Continued). *Steel,* v. 122, June 28, 1948, p. 81-84, 100, 103; July 12, 1948, p. 97-98, 100, 102, 104.
In June 28th installment—Selection and classification of organic finishing materials; primer coatings and their application; resin baking castings by induction heating. In July 12 installment—properties and applicabilities of amine-formaldehyde resin coatings; melamine, silicone, and alkyd resins; cellulose-base coatings; high-solids metal lacquers; and other cellulose finishing materials. (To be continued.)

7a-154. Surface Finishing Automobile Moldings. L. F. Strong. *Metal Finishing,* v. 46, July 1948, p. 60-61.
Polishing and buffing of garnish, reveal, and outer-panel moldings.

7a-155. Wheel Speeds for Polishing and Buffing. *Metal Finishing,* v. 46, July 1948, p. 75.
Recommended surface speeds for polishing and buffing various metals.

7a-156. Stripping Electrodeposits; Immersion and Electrolytic Type Processes. N. D. Hoffman. *Metal Industry,* v. 73, July 2, 1948, p. 6-7. A condensation.
Previously abstracted from *Plating,* v. 35, April 1948, p. 351-352, 404. See item 7a-90, 1948.

7a-157. Shielding Fan Systems From Corrosion. Walter E. Langlois. *Heating and Ventilating,* v. 45, July 1948, p. 70-72.
Protective coatings to safeguard fan systems from corrosive and abrasive action of the fumes and air moved. Tables show specific coatings that will resist the action of acids and salts. Emphasizes paints, resins, and rubbers.

7a-158. Finishing Small Parts on a Production Basis. Rollin H. Wampler. *Products Finishing,* v. 12, July 1948, p. 50, 52, 54, 56.
Methods used at a number of plants.

7a-159. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, July 1948, p. 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92.
Accelerated exposure testing of organic coatings; importance of proper control in anodizing aluminum alloys; preparation of base metal for gold plating; nonmetallic coatings for the protection of steel.

7a-160. Practical Applications of Modern Products. *Products Finishing,* v. 12, July 1948, p. 94-96, 98, 100, 102.
Modern finishing techniques boost production of Tracy "Customized" kitchens; refrigerators painted electrostatically at Norge; improved process control and increased production obtained with radiant heat.

7a-161. Recent Developments in Synthetic Resins for Protective Coatings. L. R. Whiting. *Paint, Oil & Chemical Review,* v. 111, July 8, 1948, p. 27-28, 30-32.
Use of the above on metals.

7a-162. How to Recover the Loss in the 50% Enamel Overspray. *Ceramic Industry,* v. 51, July 1948, p. 61, 64.
Based on paper by Donald W. Scott, L. A. Roe, and B. J. Sweo, *Mining Technology,* v. 11, Sept. 1947. See item 7-405, 1947.

7a-163. Engraving on Metal Plates by Means of Explosives. J. H. Cook. *Research,* v. 1, July 1948, p. 474-477.
A composite explosive charge uses explosives with different detonation velocities to insure that the detonation wave is plane and normal to the metal surface. In this way large and elegant designs can be produced.

7a-164. Die elektrochemische Untersuchung der durch basisch Uberzuge geschutzten Metalle. (Electrochemical Study of Metals Protected by Basic Coatings). V. Cupr. *Archiv fur Metallkunde,* v. 1, June 1947, p. 264-267.
A theoretical discussion which indicates the possibility of investigating phosphate and other basic coatings by electrochemical methods.

7a-165. Protective and Decorative Finishing. L. M. Towne. *Industrial Gas,* v. 27, July 1948, p. 5-7, 22-23.
Procedures and equipment of custom finisher.

7a-166. Blast Cleaning by Grit Conveyer Suction. *Western Metals,* v. 6, July 1948, p. 22-23.
Cleaning systems known as "Vacu-Blasters", in which abrasive grit is moved by suction. Various applications.

7a-167. One Coat Hammered Finishes. Johnny Nager. *Industrial Finishing,* v. 24, July 1948, p. 50, 52.
Some practical suggestions about decorative one-coat hammered finishes, baking and air-drying, correct spraying technique.

7a-168. Zinc Coatings: Thickness and Protection. *Electroplating and Metal Finishing,* v. 1, July 1948, p. 445-448.
Methods and recommendations.

7a-169. Developments in Electrostatic Paint Spraying. *Electroplating and Metal Finishing,* v. 1, July 1948, p. 449-451.

English unit designed for uniform covering of odd-shaped objects.

7a-170. The Theory and Practice of Metal Degreasing in Aqueous Media. P. D. Liddiard. *Chemistry & Industry,* July 10, 1948, p. 435-437.

7a-171. How to Paint the Product. Part 2. H. E. Linsley. *American Machinist,* v. 92, July 29, 1948, p. 89-100.

Brush painting, and the care and maintenance of bristle and synthetic-fiber brushes. Dip painting, roller coating, and centrifugal painting, and the use of an electrostatic field for detearing. The various types of spray booths and baking ovens are discussed, and information is given on methods of inspection. Safety precautions.

7a-172. Brushes in the Finishing Industry. A. J. Chandler. *Plating,* v. 35, Aug. 1948, p. 819-821.

Various types of rotary brushes, and how to select the proper type for specific applications.

7a-173. Organic Finishes for Metal Products. *Steel,* v. 123, July 26, 1948, p. 71-73; Aug. 9, 1948, p. 83-84, 86, 88, 90, 93.

Physical and chemical properties of vinyloid and chlorinated rubber-base coatings, and notes some trends in synthetic coatings. Testing organic finishes—salt spray, moisture, alkali, stain and grease resistance, hardness and distensibility tests. (To be continued.)

7a-174. Die Castings Must be Clean. Part II. Arthur P. Schulze. *Products Finishing,* v. 12, Aug. 1948, p. 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52.

Cleaning techniques employing aqueous solutions of alkaline-type compositions. Hot still tank cleaning, electrocleaning, and pressure-machine washing. 20 ref.

7a-175. The Formation of Copper Films on Non-Conductors—A Survey. Samuel Wein. *Metal Finishing,* v. 46, Aug. 1948, p. 58-60, 69.

Details a practical method for producing Cu films on nonconductors and the literature on this subject. 47 ref.

7a-176. Phosphatization of Metallic Surfaces. Michael A. Streicher. *Metal Finishing,* v. 46, Aug. 1948, p. 61-69.

Metals are given phosphate coatings by subjecting them to a dilute, aqueous solution containing one or more primary phosphates of zinc, iron, or manganese, phosphoric acid, and various types of accelerators. Coatings are produced either by immersion in this solution, or by spraying, for periods varying from a few seconds to one hour. 67 ref.

7a-177. Die gunstigsten Werte fur das Oberflächendrucken von zylindrischen Drehstabfedern. (Optimum Surface Working of Cylindrical Torsion-Rod Springs.) O. Föppl. *Metalloberfläche,* v. 1, June 1947, p. 133-137.

Theory and different methods of increasing fatigue strength of metals by means of surface working. The effect of crystal size, amount of pressure, and time of pressure application.

7a-178. Uber säurefeste Anstriche und Lackierungen. (Acid Resistant Coatings of Paint and Lacquer.) A. Kufferath. *Metalloberfläche,* v. 1, June 1947, p. 140-141.

Different acid resistant paints and lacquers and methods of preparing the metal surfaces for coating with these materials.

7a-179. Scheuern und Polieren von Massenwaren in Trommeln (Rollfässern) und Glocken. (Scouring and Polishing of Mass-Produced Articles in Drums and Bells.) H. Krause. *Metalloberfläche,* v. 1, July 1947, p. 169-171.

Principle of ball-polishing, cleaning and preparation of articles to be polished, the length of polishing and preparation of polishing solutions and other polishing compounds. Different types of ball-polishing drums.

7a-180. Die Herstellung hitzebeständiger Metallwerkstucke durch besondere Oberflächenveredelung. (Rendering Metals Heat Resistant by Special Surface-Enameling Processes.) August Kufferath. *Metalloberfläche,* v. 1, July 1947, p. 171-173.

Production of heat resistant surface coatings by means of aluminum diffusion, aluminum plating, and aluminizing. 14 ref.

7a-181. The Utilization of Enamel A-14F for Painting Turbine Assembly Surfaces Which are Exposed to Oil. (In Russian.) M. F. Sichikov and E. O. Molotova. *Kotloturbostroenie* (Boiler and Turbine Manufacture) March-April 1948, p. 30-31.

The Ural Turbine factory's enamel A-14F is investigated fully and then recommended for painting turbo-dynamo surfaces which are exposed to oil.

7a-182. Preparation of Metal Surfaces for Organic Coatings. G. R. Hoover. *Corrosion,* v. 4, Aug. 1948, p. 399-411.

Methods and results of cleaning and chemically treating surfaces of metals preparatory to receiving an organic coating.

7a-183. Organic Finishes for Metal Products. (Concluded.) *Steel,* v. 123, Aug. 23, 1948, p. 77-82, 112.

Abrasion, impact, adhesion and heat resistance testing, and the electrographic technique for porosity evaluation of protective coatings. Means of effective control over application, processing and handling of finished products.

7a-184. The Adsorbed Layer as a Passivating Factor. (In Russian.) G. S. Koshurnikov. *Zhurnal Obshchei Khimii,* (Journal of General Chemistry) v. 18, (80), March 1948, p. 388-397.

Adsorption of phenol from aqueous solution onto Fe, Zn, Fe_2O_3, and Al_2O_3 was investigated. Surface layers resulting from the adsorption are irreversible, indicating that the character of the reaction is chemical and possesses a certain thermal and chemical stability against weak acids. This stability may be "fixed" by condensation with formaldehyde or urotropine.

7a-185. Nickel Plating by Chemical Reduction. J. G. M. Bremner. *Nature,* v. 162, July 31, 1948, p. 183-184.

Proposed mechanism for the method described by A. Brenner and Riddell.

7a-186. Two-Tone Finish on Metal. John Raine. *Industrial Finishing,* v. 24, Aug. 1948, p. 48-50, 52, 54.

Method of producing a diffused and hammered effect by a single spraying with a special spray gun which receives ground and accent colors from two heated tanks.

7a-187. Metal Surface Preparation for Organic Coatings. (Concluded). A. Gellman. *Electroplating,* v. 1, Aug. 1948, p. 511-520, 530-531.

The value of metal surface preparation before painting and the way in which it is performed on sheet steel, aluminum, and zinc.

7a-188. How Metallizing Is Used for the Maintenance of the Modern Press. Rick Mansell. *Modern Industrial Press,* v. 10, Aug. 1948, p. 6, 8, 46.

Examples and techniques.

7a-189. The Mechanism of Action of Metal Protective Paints. A. C. Elm. *Paint, Oil and Chemical Review,* v. 111, Aug. 19, 1948, p. 16, 32-34, 36, 38.

Principles employed in formulation of metal protective paints.

7a-190. New Baby in the Fluorine Family. *Industrial and Engineering Chemistry,* v. 40, Sept. 1948, p. 22A, 24A.

Properties and potential applications of a number of salts of fluorophosphoric acid, recently made available in experimental quantities. Applications suggested include cleaning of metals, as electrolytic or chemical polishing agents, or in formation of protective coatings on metals, as well as in organic and physiological chemistry.

7a-191. Recent Developments in Synthetic Resins for Protective Coatings. L. R. Whiting. *Paint and Varnish Production Manager,* v. 28, Sept. 1948, p. 266-272.

Previously abstracted from *American Paint Journal,* v. 32, April 19, 1948, p. 72, 74, 76-79, 82. See item 7a-91, 1948.

7a-192. Blast Cleaning Prepares Surfaces for Finishing. L. J. Wieschhaus. *American Machinist,* v. 92, Sept. 9, 1948, p. 81-84.

Process as applied to various products.

7a-193. Mechanical Finishing With Roto-Finish Techniques. Arthur P. Schulze. *Plating,* v. 35, Sept. 1948, p. 911-916.

Particular characteristics of Roto-Finish techniques. Sizable savings are now being obtained where this method is used.

7a-194. Approximate Tables to Use for Drawing Up Hot Dip Galvanizing Pot Specifications. Part 1. Wallace G. Imhoff. *Industrial Gas,* v. 27, Aug. 1948, p. 9-12, 23.

Practical set of figures that can be used as a guide for production, metal capacity, size of pot, and side thickness of pot. (To be continued.)

7a-195. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, Sept. 1948, p. 76, 78, 80, 82, 84, 88, 90, 92, 94, 96.

Importance of passivation in surface finishing of stainless steel; proper control for production of consistently high-quality wrinkle finishes; d.c. power transmission in the plating room; and pointers in buffing aluminum.

7a-196. Metallizing—A Versatile Method for Production and Maintenance Work. John E. Wakefield. *Materials & Methods,* v. 28, Sept. 1948, p. 86-90.

Surface preparation, properties of the various sprayed metals, applications, and advantages.

7a-197. Problem: Step Up Production Without Adding Floor Space. A. J. LaPlante. *Industrial Finishing,* v. 24, Sept. 1948, p. 46-48, 50, 52.

Methods and equipment for finishing home-ironer parts, as well as space-saving layout developed.

7a-198. Does Your Oven Foul? S. C. Rubenstein. *Industrial Finishing,* v. 24, Sept. 1948, p. 54, 56; discussion, p.56.

Occasional "fouling"—the chemical reaction of the paint coating with residual vapors to produce finish defects—occurs when using gas-fired baking ovens. How to prevent the trouble, mainly by proper ventilation and clean burners.

7a-199. Painting and Lacquering Buttons by Tumbling. R. H. Mills. *Industrial Finishing,* v. 24, Sept. 1948, p. 63-64, 66, 68.

Tumbling colors, as well as clear finishes on new buttons.

7a-200. Lighten the Sprayer's Work and Increase His Efficiency. George Conrad. *Industrial Finishing,* v. 24, Sept. 1948, p. 75-76, 78, 80, 82, 84, 86.

Various modifications in equipment and its arrangement which should result in increased efficiency of the spray painter.

7a-201. Metallizing Failures to Avoid. John E. Wakefield. *American Machinist,* v. 92, Sept. 23, 1948, p. 100-103.

Recommended procedures, and some typical problems which arose in production. Proper surface preparation for good adhesion of the coating to the work is essential to long service life.

7a-202. Hangers for Electrostatic Painting. III and IV. Emery P. Miller. *American Machinist,* v. 92, Sept. 23, 1948, p. 147, 149.

Suitable wire hangers for conveyer suspension of a variety of typical parts.

7a-203. Electrostatic Spraying and Detearing; Applications of the Ransburg Process. John Stribley. *Metal Industry,* v. 73, Sept. 10, 1948, p. 211-213; *Machinery* (London), v. 73, Sept. 9, 1948, p. 417-419.

Principles, procedures, advantages, and applications of above processes, hitherto not available outside of the U. S.

7a-204. Preparing Parts for Plating with Roto-Finish Techniques. *Western Machinery and Steel World,* v. 39, Sept. 1948, p. 94-97, 118.

Tumbling routine using wet mixtures of special chips and compound that provide unusual flexibility in finishing stampings, forgings, extrusions, machined work, and die castings.

7a-205. These Hammer Finishes. George Conrad. *Organic Finishing,* v. 9, Sept. 1948, p. 20-23.

Procedures for their production on metals. Metallic pigments are used.

7a-206. Flocking With Organic Coatings. Thomas A. Dickinson. *Organic Finishing,* v. 9, Sept. 1948, p. 29-32.

Procedure in which short fibers of different materials are adhered to various surfaces for both functional and decorative purposes.

7a-207. Cleaning; Preparation of Metals Prior to Electrodeposition. R. Macnair. *Metal Industry* (London), v. 73, Sept. 10, 1948, p. 206-208; Sept. 24, 1948, p. 247-249, 252.

Advantages and disadvantages of available methods.

7a-208. Principles of Protecting Metals With Organic Coatings. A. J. Eickhoff and W. E. Shaw. *Corrosion,* v. 4, Oct. 1948, p. 463-475.

Theoretical aspects and recommendations for surface preparation and for selection and application of coatings. 23 ref.

7a-209. The Mechanism of Action of Metal Protective Paints. A. C. Elm. *Paint and Varnish Production Manager,* v. 28, Oct. 1948, p. 296-300, 302.

Previously abstracted from *Paint, Oil and Chemical Review,* v. 111, Aug. 19, 1948, p. 16, 32-34, 36, 38. See item 7a-189, 1948.

7a-210. Seek Ways to Control Surface Finish Quality. Based on "The Present Status of Surface Finish Control," by C. R. Lewis. *SAE Journal,* v. 56, Oct. 1948, p. 92-93.

Problems involved in establishment of criteria of surface-finish quality, including both roughness and character, and in development of standards providing a common reference point for work in this field.

7a-211. Some Characteristics of Sprayed Metal. G. Tolley. *Metallurgia,* v. 38, Sept. 1948, p. 263-266.

Some salient features of sprayed-metal-deposits under the headings; adhesion, hardness, and structure.

7a-212. Cleaning; Preparation of Metals Prior to Electrodeposition. (Concluded.) R. Macnair. *Metal Industry* (London), v. 73, Sept. 24, 1948, p. 247-249, 252.

Brass cleaning, bright dipping, pickling ferrous metals, the Bullard Dun process, pickling stainless steel, and pickling and etching aluminum.

7a-213. The New American Standard on Surface Finish. Geo. Schlesinger. *Machinery Lloyd* (Overseas Edition), v. 20, Sept. 25, 1948, p. 91-95.

7a-214. New Materials for Wire and Cable Applications. H. L. Wuerth. *Wire and Wire Products,* v. 23, Oct. 1948, p. 931-932.

"Geon Polyblend," a new plastic material for wire and cable insulation, developed by Goodrich Chemical Co.

7a-215. Barrel Finishing of Aircraft Parts. Joseph Wingate. *Metal Finishing,* v. 46, Oct. 1948, p. 67-74.

How, by use of accurate tests, and by sticking to established principles and fundamentals, very high grade results can be obtained with a minimum of complications. The wide range of parts that can be handled. Of particular importance is the evidence that micro-finishes as fine as 2 r.m.s. can be regularly and uniformly produced on critical parts after the normal 15 to 20 r.m.s. ground surfaces are imparted to these parts.

7a-216. Finishes for Machine Parts. Joseph Mazia. *Machine Design,* v. 20, Oct. 1948, p. 125-128.

Factors influencing choice of finish.

7a-217. Fabric-Textured Finishes on Metal Goods. Alan Chadwick. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 663-666.

"Flock Spraying" equipment and procedures.

7a-218. Design, Construction and Maintenance of Burning Tool Equipment. A. Rasmussen. *Better Enameling,* v. 19, Oct. 1948, p. 6-7, 35.

Selection of materials, design, construction, and maintenance of tools used in processing of enameled ware. Properties of Ni-Cr alloys.

7a-219. Selection and Application of Wrinkle Finishes. G. A. Conrad. *Industrial Finishing,* v. 24, Oct. 1948, p. 52, 54-56, 60, 62, 64.

7a-220. Finishing Metal Doors. Walter Rudolph. *Industrial Finishing,* v. 24, Oct. 1948, p. 66, 68, 70, 74, 76.

Procedures and equipment.

7a-221. Vapor Degreasing Equipment. George Black and Patricia Lewis. *Organic Finishing,* v. 9, Oct. 1948, p. 9-11, 16.

The various types, their advantages and disadvantages, and applicabilities for specific jobs.

7a-222. Reproducing Wood Grain. Rollin H. Wampler. *Organic Finishing,* v. 9, Oct. 1948, p. 13-16.

How to apply artificial woodgrain decorative finishes to metal, glass, plastic, or wood not having the desired grain.

7a-223. Finishing of Westinghouse Welders. Walter Rudolph. *Organic Finishing,* v. 9, Oct. 1948, p. 22-23.

Methods and equipment.

7a-224. Control of Surface Finish Improves Quality, Cuts Cost. H. R. Clauser. *Materials & Methods,* v. 28, Oct. 1948, p. 74-77.

Significance of roughness, waviness, and lay or scratch pattern and methods for their measurement. How surface-finish control improves quality and cuts costs.

7a-225. Atomizing Alloys. Bill Edwards. *Western Metals,* v. 6, Oct. 1948, p. 34-35.

Metal-spraying process used for applying a variety of nonferrous metals.

7a-226. Descaling Metals; Advantages of the Sodium Hydride Process. N. L. Evans. *Metal Industry,* v. 73, Oct. 8, 1948, p. 287-288.

Process by which it is impossible to overpickle, there being a complete absence of attack on the metal being treated. It is applicable to any metal which is not attacked by molten caustic soda at a temperature not above 370° C.

7a-227. Ceramics for Aircraft Power Plants. John M. Neff. *Iron Age,* v. 162, Oct. 21, 1948, p. 60-63.

In an effort to adapt ordinary ceramic materials to high-temperature applications, investigation is made of a method for producing protective ceramic coatings on metals. The technique embraces such oxide systems as sodium borate, calcium borate, and barium borate with, as a third member, zirconia, titania, alumina, or chromium oxide.

7a-228. Precision Tumbling Processes Improve Finishing Efficiency. C. Heamon Castle. *Steel,* v. 123, Oct. 25, 1948, p. 68-70, 94, 98.

How basic production economies can be effected by good product design combined with mechanical barrel-finishing techniques, using special chips and compounds for grinding, deburring, polishing, and coloring. 20 ref.

7a-229. Ceramic Coated Metals for Aircraft Power Plant Applications. R. A. Jones. *Finish,* v. 5, Nov. 1948, p. 42. A condensation.

Properties and methods.

7a-230. A Survey of Drying Practices in the Porcelain Enamel Industry. George N. Tuttle. *Finish,* v. 5, Nov. 1948, p. 44, 46. A condensation.

7a-231. Das Schliefen und Polieren von sogenannten Weichmetallen. (Grinding and Polishing of So-Called Soft Metals.) Richard Erdmann. *Metalloberflache,* v. 2, March 1948, p. 61-62.

Problems and difficulties, and the use of specific grinding and polishing agents and techniques for best results.

7a-232. Molten Salt Descaling by the Efco-Virgo Process. J. A. Monks and

J. McMullen. *Metallurgia,* v. 38, Oct. 1948, p. 311-314.

A descaling process, the main feature of which is chemical and physical modification of the scale by the action of molten salts which are self-regenerative. Originally developed for descaling stainless steels, the process is being increasingly applied to both ferrous and nonferrous alloys, especially where metal wastage in pickling is a serious item.

7a-233. Corrosion Protection Through Emulsions. H. F. Sarx. *Paint and Varnish Production Manager,* v. 28, Nov. 1948, p. 323-324, 326-329. Translated from *Archiv fur Metallkunde,* v. 1, Oct. 1947, p. 455-456.

Nature and production of emulsions and characteristics of water-soluble corrosion preventive emulsions.

7a-234. The Relation of Finishing to Design, Materials and Processing Methods. Edward Engel. *Metal Finishing,* v. 46, Nov. 1948, p. 61-67, 81.

The need for greater coordination of the design, engineering, and production departments with the finishing department. Emphasis is on surface finishing and its relation to the other factors in the production of metal articles. Prices, properties, surface characteristics, for a variety of metals and alloys.

7a-235. Plastic Coatings and Corrosion. C. G. Munger. *Corrosion,* v. 4, Nov. 1948, p. 557-565.

The various types of plastic coatings for metals and the properties required to prevent corrosion under diverse circumstances. Proper formulation for resistance to moisture transmission and the three modes of the latter (direct transmission, osmosis, and electroendosmis). Methods of surface preparation in order of effectiveness, methods of application, and uses.

7a-236. Metal Spraying—A Modern Production Process. A. E. Rylander. *Tool Engineer,* v. 21, Nov. 1948, p. 25-26.

Use for uniform application of metal to both metallic and nonmetallic parts.

7a-237. British Vapour Blast. Frank H. Slade. *Machinery Lloyd* (Overseas Edition), v. 20, Oct. 23, 1948, p. 96-100.

Equipment, method of use, advantages, and applications.

7a-238. Vacuum Deposition; Industrial Developments and Applications. J. H. Nelson. *Metal Industry,* v. 73, Oct. 29, 1948, p. 343-345; Nov. 5, 1948, p. 369-371, 373.

Methods and applications.

7a-239. Progress in Modern Finishing Equipment. *Industrial Finishing,* v. 25, Nov. 1948, p. 48-50, 52, 54.

7a-240. Production—A Quarter of a Century of Finishing. Rollin H. Wampler. *Industrial Finishing,* v. 25, Nov. 1948, p. 66-68.

7a-241. Electrostatic Spraying. *Industrial Finishing,* v. 25, Nov. 1948, p. 70-72, 76.

7a-242. Painting Products in a Custom Shop. R. H. Sprague. *Industrial Finishing,* v. 25, Nov. 1948, p. 92-94, 96, 98, 100, 102.

Layout, equipment, and procedures.

7a-243. Metal Coating Via "Gas Plating". *Chemical Industries,* v. 63, Nov. 1948, p. 800.

Process being developed for deposition of metals from their volatile carbonyls. Ni, Fe, Cr, W, and Mo may be plated by the process.

7a-244. Protective Coatings; Present-Day Practice in Combating Corrosion. H. Silman. *Automobile Engineer,* v. 38, Nov. 1948, p. 441-444.

Some of the outstanding problems involved in obtaining maximum durability as regards both surface protection and finish of auto-body parts. Electrodeposition, pre-painting phosphate treatments for sheet steel, and various types of organic finishes.

7a-245. Developments in Metal Decorating Inks. Robert J. Butler. *National Lithographer,* v. 55, Nov. 1948, p. 29.

7a-246. The Evolution of Metal Decorating. Clarence W. Dickinson. *National Lithographer,* v. 55, Nov. 1948, p. 30-31, 80, 82, 84, 86.

7a-247. Metallizing as a Production Process. Knowles B. Smith. *Welding Journal,* v. 27, Nov. 1948, p. 941-944.

Maintenance and production applications, preparation for metallizing and relative costs.

7a-248. Flock Coating Practices. Arthur P. Schulze. *Products Finishing,* v. 13, Nov. 1948, p. 22-26, 28, 32, 36, 38, 40, 44, 46.

Materials and coating methods.

7a-249. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 13, Nov. 1948, p. 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98.

Surface preparation for organic finishing; continuous carbon treatment of plating solutions, mechanism of film formation in organic coatings, and preparation of aluminum for plating.

7a-250. Metal Cleaning. T. C. Du Mond. *Materials & Methods,* v. 28, Nov. 1948, p. 83-94.

Metal cleaning methods and the cleaning of specific metals.

7a-251. Preparation of Metal Surfaces Preparatory to Finishing. V. M. Darsey. *Paint, Oil and Chemical Review,* v. 111, Nov. 11, 1948, p. 28-29.

7a-252. New Plating Methods That Save Time, Boost Sales. *Modern Industry,* v. 16, Nov. 15, 1948, p. 113-114, 116.

The first method is a cold-dip process for coating copper and brass with tin in a plating solution kept at room temperature, and requiring neither heat nor electrodes. The second uses a special chemical in the dipping solution to deposit a hard corrosion-resistant Ni-alloy surface on a variety of ferrous and nonferrous metals and alloys, and on graphite. The third permits mass-production electrodeposition of chromium and gold on different sections of the same metal part, using a special masking technique.

7a-253. Simultaneous Two-Color Enameling. *Iron Age,* v. 162, Nov. 25, 1948, p. 95.

Double spray gun for simultaneous enameling of two-color jobs.

7a-254. Formulation of Corrosion Resistant Paint. John W. Nee. *Corrosion,* v. 4, Dec. 1948, p. 599-610.

Properties and applications of phenolic resins, courmarone-indene resins, vinyl resins, chlorinated rubber, and specialty resins (synthetic-rubber derivatives) for such use. A few of the pigments used in formulating primers for exposure under suitable top coats in corrosive areas.

7a-255. Diphase Metal Cleaners; Relation of Emulsion Stability to Cleaning Efficiency. Irving Reich and Foster Dee Snell. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 2333-2337.

Compares two classes of metal cleaners—the unstable emulsion type and the stable type. Metal cleaning tests and umber dispersion tests were performed. In both cases diphase cleaners were more effective than stable emulsion cleaners. Reason for this.

7a-256. How to Select Inorganic Finishes. Walter R. Meyer. *Steel,* v. 123, Dec. 6, 1948, p. 112-114, 142.

Various available types, including hot dip coatings, oxide and phosphate coatings, oxidized finishes produced by sulphide solutions, and electroplated coatings; and their properties and applicabilities.

7a-257. High-Speed Rotor Tests of Paints for Under-Water Service. F. Wormwell, T. J. Nurse, and H. C. K. Ison. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 247-260.

Apparatus for investigating the corrosion of metals immersed in liquids under conditions of rapid movement. Use of the apparatus in testing a series of typical ships' bottom compositions. Parts III and IV describe use of the apparatus in comparing several paints formulated by Fancutt and Hudson. Experimental results are given in Part V. Part VI deals with methods of evaluation of paint failure in rotor tests. 17 ref.

7a-258. Flame-Spraying Corrosion Resistant Linings; A New Protective Technique. H. W. Greenwood. *Industrial Chemist and Chemical Manufacturer,* v. 24, Nov. 1948, p. 743-745.

Flame spraying of Polythene.

7a-259. Preparation of Metal Surfaces Preparatory to Finishing. V. M. Darsey. *American Paint Journal,* v. 33, Dec. 13, 1948, p. 46, 48, 50, 52-53.

Methods of metal preparation prior to painting; factors in preparation of metal for painting; methods for determining surface cleanness; difference between phosporic acid cleaning and phosphate coating of metal; phosphate coating of steel prior to painting; preparation of zinc and its alloys for painting; and preparation of aluminum and its alloys for painting.

7a-260. Sprayed Metal Coatings—Their Structure, Properties and Uses. John E. Wakefield. *Metal Progress,* v. 54, Dec. 1948, p. 827-832.

New data concerning mechanical properties of carbon steels and other metals applied by the wire-gun method, and some examples of the limitations and advantages of metal spraying in production manufacturing.

7a-261. Oberflächenschutz von Metallen durch Zinndiffusion. (Surface Protection of Metals by Vacuum Deposition of Tin.) *Metalloberfläche,* v. 1, Aug. 1947, p. 185-187.

Process and its advantages over hot dipping. Structure of layers thus obtained. The process is especially applicable to cases where close tolerances are necessary.

7a-262. Entfettung und Reinigung. (Degreasing and Cleaning.) Richard Springer. *Metalloberfläche,* v. 1, Aug. 1947, p. 200-206; Oct. 1947, p. 237-239; Nov.-Dec. 1947, p. 257-258.

Developments as revealed by patents and literature for the years 1935-1943. 138 ref.

7a-263. Einfluss der physikalisch-chemischen Eigenschaften der Pigmente auf den Korrosionsschutzfilm. (Effect

of the Physicochemical Properties of Pigments on Films for Prevention of Corrosion.) H. Wagner. *Archiv fur Metallkunde,* v. 1, Oct. 1947, p. 439-444.

This report is based on extensive research on paints and laquers. Emphasizes importance of the water content of the pigments.

7a-264. Korrosionsschutz durch Emulsionen. (Emulsions as Corrosion Preventives.) H. F. Sarx. *Archiv fur Metallkunde,* v. 1, Oct. 1947, p. 455-456.

Translation in *Paint and Varnish Production Manager,* Nov. 1948, p. 323, 324, 326-329. Annotated previously. See item 7a-233.

7b—Ferrous-Base Metals

7b-1. Selecting the Correct Porcelain Enamel Type for Specific Applications. J. E. Hansen. *Western Metals,* v. 5, Dec. 1947, p. 28-30.

Digest of paper presented at Porcelain Enamel Institute Forum, Columbus, Ohio, Sept. 1947.

7b-2. Automobile Paints: Their Application and Characteristics. H. J. Mason. *Journal of the Oil & Colour Chemists' Association,* v. 30, Nov. 1947, p. 467-478; discussion, p. 478-491.

Types of paints and painting processes used in the automobile industry; procedures and methods by which those paints are evaluated.

7b-3. Chrysler Airtemp Products Finished in Wrinkle Enamel. J. D. Loveley. *Industrial Finishing,* v. 24, Dec. 1947, p. 27-28, 32.

Equipment and procedures for finishing jackets for modern air-conditioning units and oil and gas-fired furnaces and boilers.

7b-4. Phosphate Coating of Frozen Food Cabinets. *Organic Finishing,* v. 8, Dec. 1947, p. 20-21, 23.

Procedures and equipment.

7b-5. Flame Cleaning Equipment for Steel Bridges and Buildings. T. M. Pittman, E. L. Anderson, C. M. Angel, R. E. Berggren, F. L. Etchison, C. H. R. Howe, R. M. Leeds, Francis Martin, C. E. Morgan, S. E. Tracy, and E. G. Wall. *American Railway Engineering Association Bulletin,* v. 49, Dec. 1947, p. 164-166.

Recommended procedures.

7b-6. Ceramic Coatings for High-Temperature Protection of Steel. Gilbert C. Close. *Steel Processing,* v. 33, Dec. 1947, p. 751-754.

Results obtained by W. N. Harrison, D. G. Moore, and J. C. Richmond of the National Bureau of Standards, in cooperation with the N.A.C.A. Use of a modified commercial enamel frit.

7b-7. Factors Affecting Orange Peel. John J. Steencken. *Stove Builder,* v. 13, Jan. 1948, p. 62, 64, 66, 68, 70, 72, 74, 76. Reprinted from *Journal of the American Ceramic Society,* v. 30, no. 2.

A defect in porcelain enamels.

7b-8. Hot Dip Galvanizing—What It Is and How It's Done. Rick Mansell. *Canadian Metals & Metallurgical Industries,* v. 10, Dec. 1947, p. 20-21.

7b-9. Use of Enameling on Railway Signal Systems. (In Russian.) V. S. Artamonov. *Stekol'naya i Keramicheskaya Promyshlennost (Glass and Ceramic Industry),* v. 4, Aug. 1947, p. 13-16.

Proposes substitution of enamels for paints because of greater durability. Technical data on enamel compositions, design of the parts to be enameled, methods for application.

7b-10. Fabricating and Finishing Stainless Steel—Part I. Arthur P. Schulze. *Metal Finishing,* v. 46, Jan. 1948, p. 72-77.

The properties of stainless steel and complete cleaning techniques, other than pickling. 14 ref.

7b-11. How to Choose the Correct Type of Porcelain Enamel for Specific Applications. J. E. Hansen. *Products Finishing,* v. 12, Jan. 1948, p. 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52.

Presented at 9th Annual P.E.I. Forum, Columbus, Ohio, Sept. 10-12, 1947.

7b-12. The Metallizing Process. Part II—Applications. Rick Mansell. *Steel Processing,* v. 34, Jan. 1948, p. 23-25, 44.

Use in Diesel engine maintenance; in foundries; in babbitt work; in repair of cavitated areas, especially on the blades of hydro-electric turbines; for pump rods and plungers; miscellaneous applications. Performance data and application methods.

7b-13. Zinsco Organic Finishing System Operates Under Close and Varied Controls. *Industrial Heating,* v. 15, Jan. 1948, p. 101-102, 104, 106, 108, 110-111, 174, 176, 178.

System for finishing a large variety of metal boxes and other parts for electrical switchgear, switchboards, and panelboards.

7b-14. New Porcelain Enameling Techniques. G. H. McIntyre. *Enamelist,* v. 25, Jan. 1948, p. 7-11, 60, 62.

High-speed blue ground coats; titanium-base cover-coat enamels; one-fire enamel combinations. (Presented at 15th Annual Convention, Institute of Cooking and Heating Appliance Manufacturers, Cincinnati, Ohio, Dec. 1-3, 1947.)

7b-15. A New, Synthetic Finishing System for Southern Household Prod-

ucts Co., Inc. B. L. Gamble. *Enamelist*, v. 25, Jan. 1948, p. 18-23, 58.

Procedures and equipment for enameling porch and lawn furniture, cabinets, kitchen ensembles, and other steel specialties.

7b-16. How Silk Screen Signs Are Made at California Enameling Company. Fred M. Burt. *Enamelist*, v. 25, Jan. 1948, p. 24-30.

Production of porcelain-enameled steel signs.

7b-17. How Kaiser-Frazer Cars Are Painted. T. C. Jennings. *Industrial Finishing*, v. 24, Jan. 1948, p. 34-38, 43-44, 46.

A cleaning, bonderizing, rinsing, and oven-drying set-up precedes the beginning of car painting, which includes prime coating, sealing of all welded joints, oven drying, wet sanding, and final enamel coating.

7b-18. Finishing National Cash Registers. Part II. (Concluded.) *Industrial Finishing*, v. 24, Jan. 1948, p. 54-56.

Technique of applying solid-color bake enamels, in both smooth and wrinkle finishes on bonderized, prime-coated metal cash registers.

7b-19. 1300° F. Molybdenum Enamels. Karl Kautz. *Better Enameling*, v. 19, Jan. 1948, p. 10-11, 36.

Results of further research on several typical enamels of the above type which were first reported by the author in 1941. Percentage compositions are given.

7b-20. Phosphate Coating on Metal Resists Corrosive Influences. Norman P. Gentieu. *Production Engineering & Management*, v. 21, Jan. 1948, p. 43-45.

How galvanic corrosion of ferrous metal surfaces can be greatly retarded by phosphate treatment before the final finishing operation.

7b-21. The Protection and Finish of Pressed Steel Kitchen Equipment. W. F. Coxon. *Sheet Metal Industries*, v. 25, Jan. 1948, p. 122-124.

Surface cleaning and passivation; solvent cleaning; chemical cleaning; glazing; application of rust-inhibiting priming coats and finishing coats.

7b-22. Gas Consumer Demands of the Enameler. E. W. B. Dunning. *Gas Times*, v. 54, Jan. 2, 1948, p. 34, 36.

Enameling of domestic gas appliances and prevention of manufacturing defects and defects occurring during use.

7b-23. Phosphating Processes for Surface Treatment of Iron and Steel. *Paint Manufacture*, v. 18, Jan. 1948, p. 19-20. Based on B.I.O.S. Final Report No. 1298 (Item No. 21).

Summarizes German practice.

7b-24. New Enameling Techniques. G. H. McIntyre. *Stove Builder*, v. 13, Feb. 1948, p. 47-52, 54.

Reviews the following: the high-speed blue ground coat; titanium-base, cover-coat enamels; one-fire enamels—white on steel at normal and at low temperatures; ground coats and cover coats (one and two-fire)—at low and at high temperatures. (Presented at 15th Annual Convention of Institute of Cooking and Heating Appliance Manufacturers.)

7b-25. Various Applications of Metalizing Technique in Refinery Operations. Howard Batsford. *Petroleum Refiner*, v. 27, Feb. 1948, p. 101-104.

Notes on techniques and specific applications.

7b-26. The Protection of Steel by Various Nonmetallic Coatings. J. C. Hudson and T. A. Banfield. *Journal of the Iron and Steel Institute*, v. 158, Jan. 1948, p. 99-110.

An interim report on the behavior of a range of protective nonmetallic coatings applied to structural mild steel and exposed to field corrosion tests. Part of the investigations conducted by the Protective Coatings Sub-Committee of the British Iron and Steel Research Association. The tests cover periods of up to 5 years. Includes results of sea-water immersion testing.

7b-27. How to Prevent Defects in Porcelain Enameling Holloware. F. A. Peterson. *Ceramic Industry*, v. 52, Feb. 1948, p. 50-51.

First installment of series devoted to kitchenware discusses scumming. (To be continued.)

7b-28. Protecting Ferrous Metals From Corrosion. *Machinery* (London), v. 72, Jan. 22. 1948, p. 121

Pickling and priming methods used by General Electric Co., Ltd., for the treatment of cast and fabricated ferrous components.

7b-29. Fabricating and Finishing Stainless Steel—Part II. Arthur P. Schulze. *Metal Finishing*, v. 46, Feb. 1948, p. 59-64.

Surface treatments for stainless steel: scale removal by sandblasting, pickling, molten and aqueous alkali solutions, and passivating. Formulas and methods used in the most modern processes. 10 ref.

7b-30. Production and Application of Paints for Machine Parts. A. Kufferath. *Paint and Varnish Production Manager*, v. 28, Feb. 1948, p. 38, 40-44.

Recommended formulations and procedures for iron and steel parts.

7b-31. The Deposition of Pure Boron. Part III. A Flow Method for the Preparation of Boron Films on Iron Cylinders. H. I. Schlesinger, George W. Schaeffer, Glen D. Barbaras, and John D. Farr. *U. S. Atomic Energy Commission,* MDDC-1340, Nov. 14, 1944, 10 pages.

Method and apparatus. Experimental data on effect of partial pressure of diborane and hydrogen, temperature of deposition, nature of the surface, and rate of flow on nature of the deposit.

7b-32. Report on the Evaluation of Surface Treatment of Steel Prior to Painting. Arnold J. Eickhoff. *ASTM Bulletin,* Jan. 1948, p. 77-80.

Final report of outdoor-exposure tests conducted by Subcommittee XXIX of A.S.T.M. Committee D-1 on Paint, Varnish, Lacquer, and Related Products to determine the effect of cold phosphate-phosphoric acid pretreatments of steel surfaces which were subsequently painted.

7b-33. Low Temperature Phosphate Coating for Steel Easily Applied. Norman P. Gentieu. *Materials & Methods,* v. 27, Feb. 1948, p. 74-75.

Reduction of the cost of rustproofing steel by use of a process which can be operated at low bath temperatures. This is a cold spray process known as Granodizing. Surface structures of treated and untreated sheet.

7b-34. How Much Zinc Does Pole-Line Hardware Carry? B. J. Barmack. *Electric Light and Power,* v. 26, Feb. 1948, p. 68-73.

Specifications for zinc-coating and data on the effects of different methods of preliminary surface treatment and application on coating thickness and weight per sq. ft. Results of stripping tests. Suggestions are offered toward the solution of the problem of longer-life hardware.

7b-35. Surface Preparation, Painting and Paint Baking Setup for Screen and Storm Sash. Walter Rudolph. *Industrial Finishing,* v. 24, Feb. 1948, p. 68-69, 72, 74-75.

Procedures and equipment used for steel sash.

7b-36. Aluminum Clad Strip. *Iron and Steel,* v. 21, Feb. 1948, p. 48. Based on B.I.O.S. Report No. 3617, by H. Miller and P. Hahn.

Manufacture of "Feran" steel in Germany.

7b-37. Finishing Galvanized Iron Surfaces. Ivor Richards. *Organic Finishing,* v. 9, Feb. 1948, p. 33, 36-40.

The problem of preparing the surface of galvanized-iron sheets for painting has not yet been completely solved; however, much progress has been achieved in recent years.

7b-38. Conveyer Chain Descaling. *Organic Finishing,* v. 9, Feb. 1948, p. 44-45.

Unique power-brushing technique being used in refrigerator plant.

7b-39. Handling Titanium Acid Resisting Enamels. N. H. Stolte. *Enamelist,* v. 25, Feb. 1948, p. 19-20, 47.

Recommended procedures.

7b-40. "Porcelain Wallpaper" Dramatizes the Versatility and Flexibility of "Porcelain on Steel". Dana Chase. *Finish,* v. 5, March 1948, p. 33-36.

The ceramic coating of steel in continuous sheets—from raw-steel coil to finished 100-ft. lengths.

7b-41. Novel Fixture Increases Output. *Production Engineering & Management,* v. 21, March 1948, p. 60.

"Merry-go-round" fixture for automatic-cyaniding of automobile parts at Studebaker.

7b-42. Fabricating and Finishing Stainless Steel. Part III. Arthur P. Schulze. *Metal Finishing,* v. 46, March 1948, p. 62-67, 75.

Grinding, polishing, and buffing. Cycles to follow in mechanical surface finishing of stainless. 10 ref.

7b-43. Cementiferous Paints. J. E. O. Mayne and R. S. Thornhill. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 219-228.

The mechanism of setting and the protection furnished to steel by cementiferous paints. These paints are based on mixtures of zinc dust and certain chloride solutions which produce a matrix of oxychloride cement by action on the zinc; sufficient metallic zinc is left to provide cathodic protection to steel exposed by pores. Of the chlorides tested, those of Ba and Sr produce setting at high and low humidities; Mg and Ca chlorides are satisfactory except at very high humidities. The oxychloride matrix is unstable in the presence of water, and cementiferous paints slowly disintegrate when immersed in seawater. Best results will be obtained if the cementiferous paint is covered with an organic sealing coat. 12 ref.

7b-44. Marine Exposures of Cementiferous Painting Schemes. K. A. Pyefinch. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 229-235.

Tests on painted steel specimens which were subjected to total and partial immersion in the sea for periods of up to 2 years. Three types of compositions were investi-

gated. Types in which a cementiferous primer was covered by an oleoresinous antifouling coat gave excellent results; they were particularly promising for use at the waterline, where conventional combinations give unsatisfactory results.

7b-45. Progress in the Development of "Low-Temperature" Porcelain Enamels; A Development Report on 1300° F. Molybdenum Enamels. Karl Kautz. *Finish,* v. 5, Feb. 1948, p. 25-26, 66.

Previously abstracted from *Better Enameling,* v. 19, Jan. 1948, See Item 7b-19.

7b-46. Coatings Research. *Iron and Steel,* v. 21, March 1948, p. 87-90.

B.I.S.R.A. laboratories and equipment for coatings research at Swansea, South Wales. Deals only with inorganic (mainly metallic) coatings on sheet steel.

7b-47. Metal Diffusion; German Use of Methods of Gaseous Metal Treatment. *Iron and Steel,* v. 21, March 1948, p. 91. Condensed from B.I.O.S. Report No. 1535.

Surface impregnation of ferrous articles by the Ihrig process with either silicon or aluminum.

7b-48. Protective Coverings for Marine Applications. Rolt Hammond. *Paint Manufacture,* v. 18, March 1948, p. 79-83.

Effects of marine fouling; fouling characteristics of ports; plant fouling; anti-fouling studies; effect of toxins; recent research results; uses of asphalt; bituminous paints; protection of internal surfaces; Admiralty Corrosion Committee tests; use of plastics; and flame-spraying applications. 12 ref.

7b-49. Present-Day Need for the Determination of Weight of Nickel Deposit. J. M. Zander. *Better Enameling,* v. 19, March 1948, p. 6-8.

The value of a nickel dip in preparation of steel surfaces for vitreous enameling has been clearly demonstrated. It has been observed that weights of Ni deposits vary over a wide range, especially when using nonuniform steels. Recommends determination of the weight of deposit as a control procedure for achieving higher quality and fewer rejections.

7b-50. Patterning Stainless Steel. *Electroplating,* v. 1, March 1948, p. 203-204.

Methods for producing permanent designs in various shades of yellow, brown, and black by either chemical oxidation or anodizing.

7b-51. Immersion Burner Heating Versus Steam Coil Heating in the Pickle Room. F. W. Schlensker. *Enamelist,* v. 25, March 1948, p. 12-14.

Pros and cons of the two methods, including costs.

7b-52. Paint Finishing Using Direct Oil-Fired Air Heaters. Barry F. McLaughlin. *Enamelist,* v. 25, March 1948, p. 15-17.

Refers to porcelain enameling.

7b-53. Finishing the Evans Space Heater. Robert B. Evans. *Products Finishing,* v. 12, March 1948, p. 22-24, 26.

Procedures used by Evans Products Co. in organic finishing.

7b-54. Steel Wears a Light Coat. Ralph P. Brown. *Steelways,* March 1948, p. 12-15.

Production of enameled steel and various uses.

7b-55. Antifouling Coating Tested by Scientists. R. J. McMahon. *Brush and Spray,* v. 1, March 1948, p. 4-5. Reprinted from *Motorship.*

Development of Amercoat copper-flake antifouling paint by research men at Battelle Memorial Institute, and its testing both by seawater exposure of panels and by service on a tuna clipper. Results show marked superiority over other coatings.

7b-56. Post War Progress in Porcelain Enamels; Improved Steels, Enamels and Opacifiers Bring Huge Growth to the Industry. *Rohm & Haas Reporter,* v. 6, March 1948, p. 4-7.

7b-57. Conveyerized Finishing. *Organic Finishing,* v. 9, March 1948, p. 49-50.

At Crosley Corp.'s refrigerator plant at Richmond, Ind.

7b-58. Porcelain Enameling in Italy; Including Description of Interesting Equipment and Methods. Paul A. Huppert. *Finish,* v. 5, April 1948, p. 17-20, 70, 72.

7b-59. How to Choose the Correct Type of Porcelain Enamel for Specific Applications. Part II. J. E. Hansen. *Finish,* v. 5, April 1948, p. 25-26, 66.

Types to use for kitchen utensils; gas and electric ranges; resistance to crazing; exteriors of refrigerator cases; refrigerator interiors; washing-machine tubs and component parts; table tops; plumbing ware; signs; architectural panels; hot water tanks; protection against high-temperature corrosion; protection against wear and abrasion; and industrial applications.

7b-60. Production of Range Platforms—Cover Coat Enamel Direct to Steel; A Progress Report. J. B. Simons. *Finish,* v. 5, April 1948, p. 36-37.

Encouraging progress at Electric Appliance Division, Westinghouse

Electric Corp., Mansfield, Ohio. One of the most important results is the indication that Ti-bearing killed steel is satisfactory for direct white applications.

7b-61. Metal Coatings by High Vacuum Evaporation. Philip Godley. *Iron Age,* v. 161, April 1, 1948, p. 90-94.
Fundamental aspects of evaporated coatings, and units for both continuous and batch-type work. Physical characteristics of such coatings and some interesting applications including the coating of thin plastic sheeting and condenser paper.

7b-62. Sodium Hydride Effective in Descaling Stainless Steel Sheets. M. H. Lebowitz. *Steel,* v. 122, April 5, 1948, p. 107, 110, 112.
Surface quality is improved and finishing operations speeded by use of a molten sodium hydroxide bath, impregnated with sodium hydride, at Wood Works, Carnegie-Illinois Steel Corp.

7b-63. Flame Cleaning. G. W. Rigby. *Coke and Gas.* v. 10, March 1948, p. 89-95.
Details of the oxygen flame-cleaning process for the removal of scale and corrosion products before painting.

7b-64. Metal Cleaning Processes—Part II. Uses of Alkaline Solutions. L. Sanderson. *Chemical Age,* v. 58, March 6, 1948, p. 331-333.
Used on various nonferrous metals and alloys. (To be continued.)

7b-65. Modern Porcelain Enameling. Part I. G. H. Spencer-Strong. *Ceramic Industry,* v. 50, March 1948, p. 96, 98, 100.
First of a series. Choice of equipment and plant layout. (To be continued.)

7b-66. Porcelain Enamel Process Defects. Part II. M. E. McHardy *Ceramic Industry,* v. 50, March 1948, p. 102.
Blistering, and boiling. (To be continued.)

7b-67. How to Prevent Defects in Porcelain Enameling Hollowware; Waterlining. Part 2. F. A. Petersen. *Ceramic Industry,* v. 50, March 1948, p. 104.
Recommended procedures. (To be continued.)

7b-68. Liquid Honing. *Aircraft Production,* v. 10, April 1948, p. 130-131.
Use of wet abrasive blasting for impeller finishing.

7b-69. Plates Prepared With Steel Grit. *Welding Engineer,* v. 33, April 1948, p. 60, 62.
Development of a portable blasting unit that can be located anywhere in the production line to clean plate for automatic welding.

7b-70. Hard Facing Improves Tool Life. Louis Barrett. *American Machinist,* v. 92, April 8, 1948, p. 94-95.
Application of hard facing material by metal spraying and subsequent fusion can increase performance of friction surfaces up to 14 times that of original material.

7b-71. Integrated Cleaning and Rustproofing. *Steel,* v. 122, April 12, 1948, p. 90-92.
Process and equipment used in finishing of outdoor metal furniture. A phosphate is used for rustproofing.

7b-72. Decorating With Full Color Porcelain Enameled Murals. *Iron Age,* v. 161, April 15, 1948, p. 94.

7b-73. Uniform Tank Coatings. R. W. Thrasher. *Steel,* v. 122, April 19, 1948, p. 76-80, 112, 114.
Use of a completely conveyerized setup for hot-dip galvanizing, assembly, and resistance welding of tank shell and head units and separate dome-shaped bottoms. Relative concentration of zinc in and around weld area and other problems affecting efficiency of finished tanks were studied carefully to develop the fabricating methods followed.

7b-74. The Production of Flexible Zinc Coatings. Heinz Bablik. *Corrosion and Material Protection,* v. 5, March-April 1948, p. 8-9.
Adhesive strength of coating to base and deformation of the coating in a hot-dip galvanizing process.

7b-75. Determination of Compressive Stress Present in Porcelain Enamel on Sheet Iron. E. E. Bryant and M. G. Ammon. *Enamelist,* v. 25, April 1948, p. 10-15.
Method consists of preparation of laboratory samples under carefully selected and controlled conditions and measurement of warpage produced in the sample due to application of enamel on one side. Compares data obtained with expansion curves.

7b-76. Hot Dip Galvanizing—Why It's the Sound Surface Coating. Robert B. Finn. *Weld,* v. 4, April 1948, p. 10-11.
Procedures and reasons for its soundness.

7b-77. Recommendations for an Enamel Plant Control System. John L. McLaughlin. *Better Enameling,* v. 19, April 1948, p. 6-9, 18.

7b-78. Size Is No Object in the Porcelain Enameling of Parts at McCray Refrigerator Company. *Better Enameling,* v. 19, April 1948, p. 10-13. 24-27.

7b-79. Ingenuity Marks Sanitaryware Manufacturing at Briggs. *Ceramic Industry,* v. 50, April. 1948, p. 82-83.

Covers Porcelain enameling, materials-handling, and inspection.

7b-80. Modern Porcelain Enameling. Part II. G. H. Spencer-Strong and Others. *Ceramic Industry,* v. 50, April 1948, p. 108-109, 111, 114, 117.

Continuous furnaces; spraying arrangements; drying, brushing, and inspection; layout for appliance ware; and cover-coat units. Four plant-layout diagrams. (To be continued.)

7b-81. Electrochemical Cleaning of a Large Steel Casting; an Experiment. John A. Wettergreen. *American Foundryman,* v. 13. April 1948, p. 120-124.

Results of a successful experiment conducted to determine the possibilities of removing fused sand and iron oxides from the interior of a large cast-steel turbine shell by use of an electrolytic molten-caustic bath. Presented at 52nd annual meeting, A.F.A., Philadelphia, May 3-7, 1948. Also published as Preprint No. 48-23.

7b-82. Bonderizing Process Uses Gas for Heating Solutions. *Industrial Gas,* v. 26, April 1948, p. 9, 22-23.

Use on body parts.

7b-83. Detergent Additions Improve Pickling Bath Efficiency. *Iron Age,* v. 161, April 29, 1948, p. 77.

Use of a complex organic sodium sulphonate designed as a wetting and washing agent.

7b-84. A Continuous Furnace Enameling Plant for Commercial Refrigerators. E. B. Flowers. *Finish,* v. 5, May 1948, p. 17-20, 66.

7b-85. Decorative Processes for Porcelain Enamel. H. C. Draker and R. F. Morrison. *Finish,* v. 5, May 1948, p. 31-34, 68, 70, 72.

Various decorative methods including information regarding the colors used in each case.

7b-86. How We Answered the Problem of All-White Gas Range Tops Using Titanium Enamel Over Ground Coat on Titanium Steel. B. A. Gillette. *Finish,* v. 5, May 1948, p. 40-41.

Development of satisfactory procedure.

7b-87. Fixtures Facilitate Automatic Buffing. *Iron Age,* v. 161, May 6, 1948, p. 94.

Buffing of stainless-steel moldings for automobile rear windows and windshields.

7b-88. First Report of the Methods of Testing (Corrosion) Sub-Committee. *Journal of the Iron and Steel Institute,* v. 158, April 1948, p. 463-493.

Work which led to provisional British Standard No. 1391:1947, Performance Test for Protective Schemes Embracing Stoving Paints Used in the Protection of Light Gage Steel and Wrought Iron Against Corrosion. Salt spray test was devised and standardized. Single coats of stoving paints were applied over phosphated or nonphosphated steel on typical industrial finishes. Statistical analysis of the test results.

7b-89. Recent Investigations Into the Hot-Dip Tinning of Steel Spoons and Forks. W. E. Hoare and K. W. Caulfield. *Sheet Metal Industries,* v. 25, April 1948, p. 925-930, 932.

Methods used in Great Britain, U. S., and Germany. Outlines research done on pickling and etching; composition of flux and method of fluxing; temperatures and times of immersion; use of flux and oil covers on the dipping baths; methods of manipulation, particularly for fine-tinning; methods of quenching; and quenching media.

7b-90. Mechanized Porcelain Enameling of Steel Tubs. Fred M. Burt. *Products Finishing,* v. 12, May 1948, p. 14-16, 18, 20, 22, 24, 26.

7b-91. How Tank Capacity Affects Galvanizing Cost. Wallace G. Imhoff. *Products Finishing,* v. 12, May 1948, p. 42, 44, 46, 48, 50, 52, 54.

A thorough discussion.

7b-92. Barrel Finishing of Metal Products. Part 21—The Application of Ceramic Barrels to the Finishing of Metal Products. H. Leroy Beaver. *Products Finishing,* v. 12, May 1948, p. 58, 60, 62, 64, 66, 68.

7b-93. High-Temperature Ceramic Coatings for Steel. *Steel Processing,* v. 34, May 1948, p. 245-247. Condensed from address by W. N. Harrison at Symposium on Modern Metal Protection.

Work done at National Bureau of Standards.

7b-94. Improved Automotive Finishes as Engineering Materials. M. G. Bell and W. W. Bauer. *Organic Finishing,* v. 9, April 1948, p. 48-50, 52-60. **Longer-Life Paints Coat Today's Cars.** (A condensation). *SAE Journal,* v. 56, May 1948, p. 71-72.

Trends over past 10 to 12 years.

7b-95. Recent Developments in Tin and Tin Alloy Coatings. John Ireland. *Journal of Scientific and Industrial Research,* v. 6, Aug. 1947, p. 312-317.

Mainly concerned with work of the Tin Research Institute.

7b-96. Conditions for Passivation of Stainless Steels and Its Practical Ap-

plication. L. Guitton. *Metal Treatment,* v. 15, Spring 1948, p. 3-13.

Passivation of stainless steels by chemical and anodic treatments, including sensitization. Laboratory samples and even shaped and welded parts may be perfectly resistant to normally corrosive media if passivated. 15 ref.

7b-97. Automatic Buffing Speeds Polishing. *Western Machinery and Steel World,* v. 39, May 1948, p. 80.

New semi-automatic rotary buffing machine. With six buffing heads in operation, only 12 sec. are needed for a 4-in. buff on the center, then 12 sec. for simultaneous top and bottom buffing.

7b-98. Trouble Shootin'. *Better Enameling,* v. 19, May 1948, p. 6-8.

Factors which may be responsible for trouble in the porcelain-enameling plant, and means for their rectification.

7b-99. Recommendations for an Enamel Plant Control System. Part II. John L. McLaughlin. *Better Enameling, v. 19,* May 1948, p. 16-17, 24-25, 32.

7b-100. Painting Refrigerators Electrostatically. G. P. Kennedy. *Industrial Finishing,* v. 24, May 1948, p. 38-40, 42.

Spray painting of doors and cabinets as they move by chain conveyor through an electrostatic field.

7b-101. Cleaning, Rustproofing and Painting Parts for Outdoor Metal Furniture. *Industrial Finishing,* v. 24 May 1948, p. 44-46, 48, 50, 52.

7b-102. Pullman's Production Setup for Painting Freight Cars. Walter W. Johnson. *Industrial Finishing,* v. 24, May 1948, p. 76, 78, 80, 84.

7b-103. High Temperature Ceramic Coatings for Steel Offer Many Potential Industrial Uses. *Steel,* v. 122, May 24, 1948, p. 104.

7b-104. Progress of Fluxing in Hot Galvanizing Practice. A. T. Baldwin. *Steel,* v. 122, May 31, 1948, p. 86, 88, 90.

Recent work on flux compositions and techniques. Wetting agents reduce surface tension in making up flux washes and create stable foams when flux is in fusion on molten zinc. (Presented at 20th meeting Galvanizers' Committee, St. Louis, April 15, 1948.)

7b-105. Anderung des Spannungszustandes der Werkstoffoberflache durch Atzen. (Changes in the Stress Condition of Surfaces Caused by Etching.) F. Lihl. *Archiv fur Metallkunde,* v. 1, Oct. 1946, p. 16-25.

Details of systematic research on heated soft-iron specimens. Pretreatment of the specimens and methods of photographing; surface stresses caused by use of different etchants and under different conditions; effects of heat treatment; effects of current density in electrolytic etching; superposition of etching stresses on stresses resulting from working or internal stresses.

7b-106. Essais de Préparation de Surfaces d'Acier avant Peinture. (Study of the Preparation of Steel Surfaces for Painting.) H. Baudot. *Métaux & Corrosion,* v. 23, Jan. 1948, p. 19-28; discussion, p. 28.

Painted panels were exposed to various conditions following various preliminary surface treatments. Results of four years' exposure.

7b-107. Protection de Surfaces Metalliques par la Resine Synthetique "Araldite". (Protection of Metallic Surfaces by Means of "Araldite" Synthetic Resin.) Gustave H. Ott. *Métaux & Corrosion,* v. 23, Feb. 1948, p. 41-46.

Mechanical and chemical properties of "Araldite 985" films of different thicknesses. Methods of use and applications, one of which is as a flexible-tube coating. Test panels after exposure to various chemicals for different periods of time.

7b-108. An Early Headache Becomes a Practical Movable Building. L. W. Ray. *Finish,* v. 5, June 1948, p. 18-22, 70, 73.

Development of the original porcelain-enameled, all-steel building—the White Castle hamburger stand—and gives evidence of its practicability.

7b-109. Forming Oxide Films on Electrical Steel. P. L. Schmidt. *Electrical Engineering,* v. 67, June 1948, p. 538. Digest of A.I.E.E. paper 48-120, "Formation of Oxide Films on Electrical Steel".

Process developed for consistently obtaining tightly adherent, highly resistant, blue-black, magnetic, iron oxide coatings at low temperatures on electrical-steel laminations to minimize interlaminar eddy currents.

7b-110. Service Trials of Painting Schemes Applied to a Steelworks Gantry. J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 159, May 1948, p. 60-66.

Results of practical painting trials compared with those of small-scale outdoor exposure tests. Both agree in showing that the efficiency of the paint is greatly increased by removing the mill scale by pickling before applying the paint.

7b-111. Fabricating and Finishing Stainless Steel. Arthur P. Schulze.

Metal Finishing, v. 46, June 1948, p. 103-109.

Blackening for appearance and additional corrosion resistance; miscellaneous operations such as soldering, brazing, and welding; and mechanical and chemical etching. Formulas, methods, and operating conditions.

7b-112. Improved Physical Properties of Titanium Enamels Provide Better Steel Finish. Burnham W. King. *Steel,* v. 122, June 21, 1948, p. 108, 111, 128. 130.

How scratch, abrasion and impact resistance, reflectance, opacity or hiding power, and resistance to chemical attack have been enhanced by continued development work in the use of titanium dioxide. Properties are charted vs. enamel thickness and other factors. 16 ref.

7b-113. Uber den Anfall von Hartzink bei der Feuerverzinkung. I. Einfluss des Reinheitsgrades bzw. der Legierungsbestandteile des Eisen und Zinks und der Vorbehandlung der Ware. II. Einfluss der Eintauchdauer, der Temperature-und der Hartzinkannahme. III. Der Einfluss der Bauart und Beheizung der Verzinkungspfannen auf die Hartzinkbildung. (Formation of Brittle Iron-Zinc Alloy Layers During Galvanizing. Part I. Influence of Purity and Alloy Constituents of the Iron and Zinc and of Pretreatment of the Parts. Part II. Influence of Immersion Time, Temperature, and Growth of the Iron-Zinc Alloy Layer. Part III. The Effect of the Construction and Heating Method of the Galvanizing Tanks on Formation of the Iron-Zinc Alloy Layer.) Edmund R. Thews. *Metalloberfläche,* v. 1, Feb. 1947, p. 39-42; March 1947, p. 61-63; April 1947, p. 84-86.

Twenty-six factors have been identified which may affect the formation of brittle Fe-Zn alloy layers during galvanizing. Supporting experimental evidence.

7b-114. Korrosionsschutz durch Inkromierung. (Corrosion Protection by Chromium-Diffusion Coatings.) Fritz Steinberg. *Metalloberfläche,* v. 1, March 1947, p. 58-60.

Chromium diffusion coatings are formed on steel at 1000° C. by sealing parts to be coated inside a retort containing chromium chloride. The surface layer may have an alloy content as high as 35% Cr. Applications, methods of fabrication and welding, and corrosion data.

7b-115. Verfahren zur Entplattierung von Kupfer-und messingplattiertem Eisenschrott. (Stripping of the Electroplate From Copper and Brass-Plated Scrap Iron.) Carl Schaarwächter. *Metalloberfläche,* v. 1, April 1947, p. 89-90.

Three processes were studied for the recovery of copper from plated scrap: oxidation at 960° C. in a muffle furnace; chemical removal by an ammoniacal solution; and electrocuring with an acid or cyanide bath. The latter method gave the best results.

7b-116. Continuous Strip Pickling. Edwin D. Martin. *American Iron and Steel Institute, Preprint,* 1948, 53 pages.

Developments and problems involved in chemical removal of oxide scale, formed during hot rolling, from mild, plain-carbon steel; equipment and procedure for pickling; disposal of waste pickle liquor.

7b-117. An Accelerated Test for Evaluating the Protective Power of Finishes Against Sulfur Dioxide. Alfred J. Arker and Wayne R. Frisch. *Organic Finishing,* v. 9, May 1948, p. 9-19.

Test apparatus in which the finish is subjected to an atmosphere of warm, moist SO_2 and the average weight gained per unit area exposed determined for various times of exposure. Empirical equations are developed to correlate data from equipment of different sizes and to obtain comparative values of "protective power".

7b-118. Huge Steel Casting Successfully Cleaned Electrolytically in Molten Caustic Bath. *Industrial Heating,* v. 15, June 1948, p. 1018. Based on paper by John A. Wettergreen.

Previously abstracted from *American Foundryman,* v. 13, April 1948, p. 120-124. See item 7b-81, 1948.

7b-119. Spray Pickling of Enamel Ware. *Industrial Heating,* v. 15, June 1948, p. 1020, 1022. Based on paper by George N. Tuttle.

Previously abstracted from *Enamelist,* v. 24, Oct. 1947, p. 4-7, 58-59. See item 7-422, R.M.L., v. 4, 1947.

7b-120. 1300° F. Porcelain Enamels—A New Era in Product Finishing. Albert B. Friedman. *Better Enameling,* v. 19, June 1948, p. 5, 19.

New development and necessary changes in enameling techniques.

7b-121. Trouble Shootin'. *Better Enameling,* v. 19, June 1948, p. 12-14.

Defects in porcelain enamel and their remedies: defective steel surface; burned carbon area; burrs; etched or pitted condition; onion skin or deoxidized scale; and inclusions.

7b-122. Recommendations for an Enamel Plant Control System. Part

III. (Concluded). John L. McLaughlin. *Better Enameling,* v. 19, June 1948, p. 16-17, 36.

7b-123. Finishing Metal Caskets on Conveyor Lines. Robert Zureick. *Industrial Finishing,* v. 24, June 1948, p. 28-30, 33-34, 38, 40.

Mass production methods and modern equipment are used for preparing the surfaces of steel caskets and hardware for spraying, and for drying all protective and decorative coatings.

7b-124. Evaluating Hydrogen Embrittlement in Acid Pickling. M. Rosenfeld. *Iron Age,* v. 161, June 17, 1948, p. 82-87.

By means of the standard tensile test, embrittlement effects by hydrochloric and sulphuric acids were evaluated. The value of immersion in boiling water after pickling and the use of various reagents in the pickling acids. 11 ref.

7b-125. Corrosion Inhibiting Primers for Ferrous Metals. W. G. Huckle and H. S. Davidson. *American Paint Journal,* v. 32, June 28, 1948, p. 76-77, 80, 82, 84-85, 88, 90-96, 98.

Experimental work designed primarily to determine what pigment or pigments give most satisfactory results when used with zinc chromate. Relative effectiveness of various types of pigments; various types of binders; determination of amount of zinc yellow required for effective metal protection; and comparison of several primers applied to sandblasted, rusted, or mill-scaled steel surfaces.

7b-126. Pneumatic Hand-Chipping. P. S. Paluch. *Iron and Steel Engineer,* v. 25, June 1948, p. 86-87; discussion, p. 95-97.

Recommended procedures for removing surface defects from semi-finished steel.

7b-127. Application of Hand Scarfing to Modern Surface Conditioning. P. S. Paluch. *Iron and Steel Engineer,* v. 25, June 1948, p. 87-91; discussion, p. 95-97.

7b-128. Billet Conditioning With Mechanical Chippers. J. H. Vollmer. *Iron and Steel Engineer,* v. 25, June 1948, p. 91--95; discussion, p.95-97.

7b-129. Abrasive Blasting Speeds Pipe Cleaning. *Iron Age,* v. 162, July 1, 1948, p. 79.

7b-130. Electrostatic Spray Lowers Labor and Upkeep Costs. G. P. Kennedy. *Factory Management and Maintenance,* v. 106, July 1948, p. 98-99.

Entire painting operation on refrigerator cabinets and doors is accomplished in a single conveyerized pass through a single spray booth.

7b-131. Interpretation of Data Relating to Coefficient of Expansion of Various Types of Porcelain Enamels. Part I. R. L. Fellows and O. R. Novy. *Better Enameling,* v. 19, June 1948, p. 6-11, 35.

Use of the data in the selection of porcelain enamels. (To be continued.)

7b-132. Vitreous Enameling of Chemical Plant. James D. Currie. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B99-B109; discussion, p. B109.

Properties of vitreous linings for mild steel and cast-iron vessels with a highly acid resisting enamel.

7b-133. Porcelain Enamel Process Defects; Causes and Possible Cures. Part IV. Crazing, Tearing, Crawling. M. E. McHardy. *Ceramic Industry,* v. 51, July 1948, p. 52, 60. (To be continued).

7b-134. How to Prevent Defects in Porcelain Enameling Holloware. Part IV. Spontaneous Failures. F. A. Petersen. *Ceramic Industry,* v. 51, July 1948, p. 59-60.

7b-135. Reversing a Natural Process Cleans Metals More Economically. *Inco Magazine,* v. 22, Summer 1948, p. 13-14.

Sodium-hydride descaling process.

7b-136. Finishing Home Freezer Cabinets. J. R. Streeter. *Industrial Finishing,* v. 24, July 1948, p. 26-28, 30, 32.

How Kelvinator home freezers and ice-cream cabinets are finished.

7b-137. Painting Chevrolets in California Plant. Fred M. Burt. *Industrial Finishing,* v. 24, July 1948, p. 36-38, 40, 42, 44, 46, 49.

7b-138. Finishing of Washers and Ironers at Apex Electrical Manufacturing Co. Plant. *Industrial Heating,* v. 15, July 1948, p. 1193-1194, 1196, 1198, 1200, 1202-1204.

7b-139. Spraying Porcelain Enamel; Some Practical Hints for the Operator. L. W. Lammiman. *Enamelist,* v. 25, July 1948, p. 17-24.

7b-140. Magnetism Applied to Silk-Screen Processing on Porcelain Enameled Sheets. E. H. Brandenburg. *Enamelist,* v. 25, July 1948, p. 50-51, 54.

Design of magnetic table which accommodates a wide range of sheet sizes and which is quickly adjustable. Decorative patterns are also held in contact with curved or irregular surfaces without jigs or clamps, the underside of the pattern being coated with ferrous material.

7b-141. Interpretation of Data Relating to Coefficient of Expansion of Various Types of Porcelain Enamels. Part II. R. L. Fellows and O. R. Novy. *Better Enameling,* v. 19, July 1948, p. 6-11, 33.

Results of an investigation made to determine whether the precipitation of an opacifier from a frit has any effect on the coefficient of expansion of the enamel and also whether the correlation of coefficient of expansion and expansiometer tests as described in Part I holds true for various types of porcelain enamels.

7b-142. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 19, July 1948, p. 16-17.

Enameling defects; foreign bodies embedded in the iron and rusty conditions.

7b-143. The Relation of Firing Temperature to Warpage of Fabricated Parts. B. D. Bruce. *Better Enameling,* v. 19. July 1948, p. 18.

Recommends firing below 1330°C., the lower critical temperature for steels with more than 0.04% C., to prevent warpage.

7b-144. Coating Steel With Nickel by Immersion in Nickel Chloride Solutions. W. A. Wesley and H. R. Copson. *Journal of the Electrochemical Society,* v. 94, July 1948, p. 20-31.

A simple method for depositing controlled amounts of nickel on steel by chemical displacement from a hot nickel chloride, boric acid solution. Deposits to 30 millionths inch in thickness can be readily produced. Suitable heat treatment of these deposits renders them compact and adherent and at the same time causes diffusion of the nickel and iron. It is believed that steel coated in this way has its surface altered sufficiently to serve as a better basis for other coatings.

7b-145. Sensitivity of Different Steels to Pickling Brittleness. C. A. Zapffe and M. E. Haslem. *Wire and Wire Products,* v. 23, July 1948, p. 563-569, 609-612.

An investigation on behavior of steels under conditions of cathodic pickling vs. straight acid pickling.

7b-146. Vitreous Enamelling Technique. *Electroplating and Metal Finishing,* v. 1, July 1948, p. 442-444, 458.

Process will permit application of relatively thin coatings with very little tendency to chipping and cracking.

7b-147. Corrosion Inhibiting Primers for Ferrous Metals. W. G. Huckle and H. S. Davidson. *Paint, Oil & Chemical Review,* v. 111, July 22, 1948, p. 18, 20-22, 24-28.

Results of an extensive experimental investigation of the effects on primer performance of introducing additional pigments into Zn-yellow primers. Seventeen different pigments or auxiliary materials were evaluated. Effects of various preparation factors.

7b-148. Strip Tension and Velocity Control. Chris Diechert. *Steel,* v. 123, July 26, 1948, p. 69-70, 102.

Use as key factors in continuous cleaning, plating, and coiling steel venetian-blind stock.

7b-149. Process Sheet for Chromising Steel. George Black. *American Machinist,* v. 92, July 29, 1948, p. 123.

Recommended procedures.

7b-150. First in New Ceramic Era—Lustron's $13 Million Plant. *Ceramic Industry,* v. 51, Aug. 1948, p. 56-58, 102.

Largest porcelain enameling operation in the world.

7b-151. How to Prevent Defects in Porcelain Enameling Holloware. Part V. Tearing. F. A. Petersen. *Ceramic Industry,* v. 51, Aug. 1948, p. 59-60.

7b-152. Porcelain Enamel Process Defects; Causes and Possible Cures. Part V. Jumpers, Pop-Off, Copper-Heads. M. E. McHardy. *Ceramic Industry,* v. 51, Aug. 1948, p. 61-62.

7b-153. Frigidaire's Canadian Enameling Plant. R. G. Drinnan. *Finish,* v. 5, Aug. 1948, p. 19-22, 63, 65, 68, 70.

7b-154. Waterlining as Related to Dry Beading. A. I. Andrews and W. D. Fitzpatrick. *Finish,* v. 5, Aug. 1948, p. 23-27, 56, 62.

Titanium-opacified cover enamels are said to be especially subject to waterlining when wet beading enamel is applied to the wiped edge of previously dried cover enamel. This results in some of the water from the beading enamel soaking into the dry cover coat bisque, discoloring it and sometimes causing tearing. Seven types of cover-coat enamels and three types of beading enamels were investigated for the effects of various factors on waterlining. The latter included rate of drying; use of different frits; use of organic-liquid vehicles; time and temperature of firing; use of different mill additions; aging; use of different soluble salts during firing; and use of firing agents.

7b-155. Production of Commercial and Reachin Refrigerators; Applying Zirconium Cover Coat Direct to Titani-

um Steel. M. E. McHardy. *Finish,* v. 5, Aug. 1948, p. 42, 62.

Development of satisfactory procedures.

7b-156. Electrolizing Prolongs Tool Life and Protects Wear Parts. *Tool & Die Journal,* v. 14, Aug. 1948, p. 56.

New process-treatment said to greatly prolong life of cutting tools, dies, gages, and wear parts. It involves a high-frequency treatment which raises the fatigue point of the tools, and a process of evaporation and condensation by which a 0.00003 to 0.00005 in. layer of a new hard alloy is deposited upon the cutting edges or working surfaces.

7b-157. Continuous Strip Pickling. Edwin D. Martin. *Blast Furnace and Steel Plant,* v. 36, July 1948, p. 825-832. Aug. 1948, p. 942-949, 953.

Previously abstracted from *American Iron and Steel Institute, Preprint,* 1948. See item 7b-116.

7b-158. Continuous Coating of Steel Strip: I. F. M. Morrow and K. Oganowski. *Industrial Heating,* v. 15, July 1948, p. 1166, 1168, 1170, 1172. A condensation.

Processing of the metal base, coil tempering, quality control, production rates, cost aspects, continuous-line operation problems, and equipment design, as applied to continuous coating of steel strip in coils and sheets. (To be continued.)

7b-159. Chromising Steel Surfaces. George Black and Edward Rosen. *Metal Finishing,* v. 46. Aug. 1948, p. 70-72.

Chromising is a general term covering various methods for producing on the surface of steel parts an integral layer high in chromium content. The coating is formed by means of a diffusion process in which iron atoms are gradually replaced by chromuim atoms so that the resultant chromised layer is rich in chromium at the surface, showing a gradual decreasing chromium content with increasing depth.

7b-160. Aluminum Coating of Steel Products. Armand Di Giulio. *Wire and Wire Products,* v. 23, Aug. 1948, p. 670-675.

Applications and methods employed with Upton salt-bath method.

7b-161. Coatings That Laugh at Heat, Wear, Corrosion. *Modern Industry,* v. 16, Aug. 15, 1948, p. 40-44.

Many uses of porcelain enamel as a coating for steels and other materials. Progress in developing high-temperature enamels, elimination of ground coat, low-temperature enamels, and special enamels.

7b-162. Flame Cleans Rails to Prevent "Freezing" of Joint Bars. U. F. Portell. *Railway Engineering and Maintenance,* v. 44, Sept. 1948, p. 925.

Method for removal of mill scale, rust and moisture.

7b-163. Conditions in the Pickling Bath Which Affect Hydrogen Embrittlement. C. A. Zapffe and M. E. Haslem. *Wire and Wire Products,* v. 23, Sept. 1948, p. 753-761, 792, 793.

Test procedure, and results of investigation of effect of acid type and concentration, of temperature, of promoters and of inhibitors. Under the latter heading, effect of six commercial pickling inhibitors for stainless steel were studied.

7b-164. High Production Galvanizing of Small Parts. Walter Rudolph. *Metal Finishing,* v. 46, Sept. 1948, p. 62-63, 67.

Equipment and methods.

7b-165. Electrostatic Descaling for High-Speed Production. Arthur P. Schulze. *Production Engineering & Management,* v. 22, Sept. 1948, p. 67-71.

Use of the Bullard-Dunn process for scale and oxide removal from ferrous parts on a volume production basis.

7b-166. Layout of Porcelain Enameling Department: Lustron Corp. *Ceramic Industry,* v. 51, Sept. 1948, p. 68-70.

Also brief description of enamel preparation and application and list of suppliers for the department.

7b-167. Continuous Strip Pickling. Part II. Edwin D. Martin. *Blast Furnace and Steel Plant,* v. 36, Sept. 1948, p. 1089-1094.

Previously abstracted from *American Iron and Steel Institute Preprint.* 1948. See item 7b-116, 1948.

7b-168. Gas Convection Heating Cures Automotive Finishes at Briggs Manufacturing Co. II. Arthur Q. Smith. *Industrial Heating,* v. 15, Sept. 1948, p. 1557-1558, 1560, 1562, 1564.

Oven requirements for paint drying; air heaters; spray-paint booths, each equipped to apply 18 separate colors; polishing rooms; general statistics; and the results obtained with the heating equipment described in this and the preceding article.

7b-169. The Degreasing of Sheets Prior to Enamelling. Pierre Tyvaert. *Foundry Trade Journal,* v. 85, Sept. 2, 1948, p. 235. Translated from *Fonderie.*

Recommended procedure.

7b-170. The Role of Paint in Combating Corrosion in the Petroleum Industry. Paul L. Lotz. *Proceedings*

American Petroleum Institute, v. 28M (III), 1948, p. 19-20; discussion, p. 21.

7b-171. The Relation of Firing Temperature to Possible Enameling Defects Resulting from Steel Gas Evolution. B. D. Bruce. *Better Enameling,* v. 19, Sept. 1948, p. 18.

7b-172. Galvanizing Without Prior Pickling. *Electroplating and Metal Finishing,* v. 1, Sept. 1948, p. 572-573.

Further details of French patented process referred to in July issue. The information was obtained by personal interview with French firm using the process.

7b-173. Pitting of Steel Parts During Barrel Tumbling. A. L. Simmons. *Metal Progress,* v. 54, Sept. 1948, p. 349.

As a result of laboratory tests, it was found no pitting occurred in a pH range of 10.4 to 11.4. This was achieved by use of soda ash.

7b-174. Restrainers; Use of Foaming and Non-Foaming Inhibitors. *Iron and Steel,* v. 21, Sept. 1948, p. 407.

Use to minimize acid spray and attack on the base metal during pickling of steel.

7b-175. Porcelain Enameling Mild Steel; What the Enameler Can Do to Help Himself. *Enamelist,* v. 25, Sept. 1948, p. 9-12.

Recommendations concerning the use of mild steel as a substitute for high-grade enameling iron.

7b-176. Inside Views of Some Enameling Difficulties. J. J. Canfield. *Enamelist,* v. 25, Sept. 1948, p. 13-21. Reprinted from *Journal of the Canadian Ceramic Society,* v. 17, 1948.

Various types of defects, together with their remedies.

7b-177. How to Prevent Defects in Porcelain Enameling Holloware. Part VI. Handling Defects. F. A. Petersen. *Ceramic Industry,* v. 51, Oct. 1948, p. 71-72.

7b-178. Porcelain Enamel Process Defects; Causes and Possible Cures. Part VI. Hairlines, Scale. M. E. McHardy. *Ceramic Industry,* v. 51, Oct. 1948, p. 73, 124, 126.

7b-179. Vitreous Enameling Nameplates. Albert Hall. *Ceramic Industry.* v. 51, Oct. 1948, p. 74-75.

7b-180. Synthetic Painting; A New Finishing Plant at the Works of Austin Motor Co., Ltd. *Automobile Engineer,* v. 38, Sept. 1948, p. 356.

7b-181. Rehabilitation of Existing Pipe Lines. Alfred B. Anderson. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 57-59.

An electrolytic method for depositing an especially prepared bitumen compound from an aqueous solution onto the interior of the pipe, after cleaning, and while the pipe is still in place. Applied to cast-iron water lines.

7b-182. Finishing Calculating Machines. Geral Dean Brodien. *Organic Finishing,* v. 9, Sept. 1948, p. 11-15.

Procedures and equipment used by Marchant Calculating Mach. Co.

7b-183. Regeneration System for Pickle Liquor. Edwin D. Martin. *Iron Age,* v. 162, Sept. 30, 1948, p. 60-63, 66.

Research toward development of system for a continuous strip-pickling line and details of the process developed.

7b-184. Compressed Air—A Versatile Medium in Appliance Manufacturing Plants. John Hennessey. *Finish,* v. 5, Oct. 1948, p. 17-19.

Various compressed-air-operated equipment used in enameling plants.

7b-185. Metal Preparation and Finishing in the Ceramic Division. E. E. Howe. *Finish,* v. 5, Oct. 1948, p. L19-L30.

At Lustron Corp., Columbus, Ohio. Includes large folding diagram showing details of plant layout.

7b-186. Sheet and Tinplate Manufacture; The Pickling Process. J. H. Mort. *Iron and Steel,* v. 21, Sept. 1948, p. 403-407.

Fundamental considerations, plant procedures, and equipment. (Cont.)

7b-187. Approximate Tables to Use for Drawing up Hot Dip Galvanizing Pot Specifications. Part II. Wallace G. Imhoff. *Industrial Gas,* v. 27, Sept. 1948, p. 11-13, 27-29.

7b-188. Evaluation of Pickling Inhibitors from the Standpoint of Hydrogen Embrittlement. I. Acid Pickling of Stainless Steel. C. A. Zapffe and M. E. Haslem. *Wire and Wire Products,* v. 23, Oct. 1948, p. 933-939.

By means of a special bend test, the field of commercial pickling inhibitors is surveyed from the standpoint of hydrogen embrittlement incurred during the pickling of stainless steel in sulphuric acid.

7b-189. Rust Prevention of Equipment in Storage and Use. *Lubrication,* v. 34, Oct. 1948, p. 109-120.

Use of oils, compounds, and greases; procedures for preserving engines, ball and roller bearings, turbines, hydraulic equipment, machine tools, hand tools, spare parts; cleaning; drying; application of rust preventives; packaging; and test methods.

7b-190. Production Painting Setup for Farmall Tractors. R. E. Snyder. *In-*

dustrial Finishing, v. 24, Oct. 1948, p. 42-44, 47-48, 50.

7b-191. Flow Coating Automobile Chassis Frames. Paul A. Peterson. *Industrial Finishing,* v. 24, Oct. 1948, p. 78, 80, 82, 84.

7b-192. Bally Case and Cooler Company. *Better Enameling,* v. 19, Oct. 1948, p. 8-14.

Production of porcelain-enameled commercial refrigerated display cases.

7b-193. A Discussion of the Use of 1300° F. Enamels Applied to Sheet Steel. B. D. Bruce. *Better Enameling,* v. 19, Oct. 1948, p. 16-17, 36.

Advantages and disadvantages over enamels which are fired at higher temperatures.

7b-194. The Production Application of Titanium Enamels. Harold C. Wilson. *Better Enameling,* v. 19, Oct. 1948, p. 18-19, 36.

Recommended procedures.

7b-195. Streamlined Bumper Production. Ezra A. Blount. *Products Finishing,* v. 13, Oct. 1948, p. 20-26, 28, 30, 32, 34.

Polishing, plating, and handling.

7b-196. Barrel Finishing of Metal Products. Part 25. Factors in the Barrel Finishing of Stainless Steels. H. Leroy Beaver. *Products Finishing,* v. 13, Oct. 1948, p. 40, 42, 44, 46, 48, 50, 52.

7b-197. Residual Stresses in Enameled Sheet-Iron Specimens. R. A. Jones and A. I. Andrews. *Journal of the American Ceramic Society,* v. 31, Oct. 1, 1948, p. 274-279.

A method of quantitatively measuring the stresses is explained. It involves measuring with a mechanical strain gage the dimensional changes which occur when an enameled-metal specimen is de-enameled. The theoretical approach to the problem. 11 ref.

7b-198. Roughen Stainless Before Nitriding. S. DeDomenico. *American Machinist,* v. 92, Oct. 21, 1948, p. 96-97.

Ordinary nitriding equipment can be used for martensitic stainless steels, if the surface is roughened by sandblasting, pickling, or bright hardening.

7b-199. Surface Finishing of Stainless Steels. K. M. Huston. *Plating,* v. 35, Nov. 1948, p. 1106-1110, 1142.

Factors involved and recommended methods. Written from the viewpoint of the practical man. Chemical and electrochemical procedures.

7b-200. How to Prevent Defects in Porcelain Enameling Holloware. Part VII. Shorelines, Scratch Blisters, Discoloration of Red Beads. F. A. Petersen. *Ceramic Industry,* v. 51, Nov. 1948. p. 73.

7b-201. Porcelain Enamel Process Defects; Causes and Possible Cures. Part VII. Poor Draining, Burn-off, Sagging. M. E. McHardy. *Ceramic Industry,* v. 51, Nov. 1948, p. 74-75.

7b-202. The Application of Cover Coats Directly on Steel. M. E. McHardy. *Finish,* v. 5, Nov. 1948, p. 39-40. A condensation.

Production methods using titanium steel.

7b-203. The Use of 1300° F. Enamels Applied to Sheet Steel. B. D. Bruce. *Finish,* v. 5, Nov. 1948, p. 42-43.

Previously abstracted from *Better Enameling,* v. 19, Oct. 1948, p. 16-17, 36. See item 7b-193, 1948.

7b-204. The Production Application of Titanium Enamel. Harold C. Wilson. *Finish,* v. 5, Nov. 1948, p. 46, 48. A condensation.

7b-205. Porcelain Enamel for Electrically Operated Products. I. Elias Jones. *Electrical Manufacturing,* v. 42, Nov. 1948, p. 78-81, 172, 174, 176, 178, 180.

Postwar developments in improved base-metal specifications, better enamels, and more efficient methods of application have reduced the cost and increased the field of use for finishing method for electrical appliances. 26 ref.

7b-206. Paint in Civil Engineering. Rolt Hammond. *Paint Manufacture,* v. 18, Oct. 1948, p. 343-346.

Use of paint for prevention of corrosion of outdoor structural steel. Corrosion mechanisms, the effect of welding, and use of metallic coatings.

7b-207. Sheet and Tinplate Manufacture; The Pickling Process. J. H. Mort. *Iron and Steel,* v. 21, Oct. 1948, p. 437-441.

Practical procedures, including details of necessary calculations. (To be concluded.)

7b-208. Finishing Conlon Washers and Ironers. George Conlee. *Industrial Heating,* v. 15, Oct. 1948, p. 1774-1775, 1777-1778, 1780, 1782, 1784-1786, 1847-1848.

Procedures and equipment.

7b-209. High-Temperature Ceramic Coatings for Steel. *Industrial Heating,* v. 15, Oct. 1948, p. 1804, 1806, 1808, 1810, 1812, 1817. Summarized from paper by W. N. Harrison.

Work at the National Bureau of Standards as a result of which a new type of ceramic coating for high-temperature protection of mild

steel was developed. The composition of the NBS Type A-19 coating is: 50 parts infusible frit, 25 parts calcined alumina, 10 parts enamelers clay, and other minor ingredients.

7b-210. The Use of Flame Cleaning in Painting Gasholders. *Gas Times,* v. 57, Oct. 8, 1948, p. 31-34.

Experiences in this use of flame cleaning.

7b-211. Oil Composition in Alkaline Cleaning. Samuel Spring and Louise F. Peale. *Industrial and Engineering Chemistry,* v. 40, Nov. 1948, p. 2099-2102.

Free fatty acid was shown to facilitate the removal of oils from pickled steel surfaces. Addition of oil-soluble sodium sulphonate soaps to mineral or lard oil results in improved cleaning, whereas its addition to sulphurized oils usually makes cleaning more difficult.

7b-212. The Successful Application of Titanium Enamels. Harold C. Wilson. *Stove Builder,* v. 13, Nov. 1948, p. 82, 84, 86, 88, 90.

7b-213. Process Sheet for Calorizing Steel. George Black. *American Machinist,* v. 92, Nov. 4, 1948, p. 135.

Calorizing covers a variety of methods for applying and diffusing aluminum to steel (and other metal) surfaces. Recommended procedures.

7b-214. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. Progress Report No. IV. *American Paint Journal,* v. 33, Nov. 6, 1948, p. 8, 10, 26, 28, 30; Nov. 9, 1948, p. 28, 30, 32.

Results of extensive series of tests.

7b-215. Large Steel Products Company Protects Galvanized Steel With Zinc Dust Paint. *Paint Progress,* v. 7, No. 3, [1948], p. 2-3.

As applied to galvanized roofing and siding.

7b-216. Modern Porcelain Enameling. Chapter III. Preparation of Metal. Part I. Alexis J. Hannan and Lee R. Fuller. *Ceramic Industry,* v. 51, Nov. 1948, p. 70-71.

Chemical methods of surface preparation. (To be continued.)

7b-217. Shop Processing of Titanium Enamels Direct to Titanium Steels. John L. Lannan. *Better Enameling,* v. 19, Nov. 1948, p. 6-7, 26-27.

Development of a satisfactory procedure, including a history of difficulties encountered and their remedies.

7b-218. Pickle and Millroom Practice and Procedure for Application of Titanium Enamel Direct to Titanium Steel. John C. Swartz. *Better Enameling,* v. 19, Nov. 1948, p. 12-15, 29.

7b-219. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 19, Nov. 1948, p. 17-18.

Porcelain-enameling defects: water break of ground-coat slip on dipping, dried (bisque) blisters or bubbles, and water line.

7b-220. Setup for Surface-Treating and Painting Black Auto Horns. Daniel P. Waits. *Industrial Finishing,* v. 25, Nov. 1948, p. 104, 106, 108, 110.

7b-221. Pickling by Acids and by Sodium Hydride. *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 724-731.

Reports on papers by W. F. Bews and by N. L. Evans, respectively, on these pickling methods, presented to Electrodepositors Technical Society, London, Sept. 20, 1948, Includes discussion.

7b-222. Determination of Nickel Deposition by a Colorimetric Method as Applied to Enameling Iron. E. A. Brown and N. H. Stolte. *Enamelist,* v. 25, Nov. 1948, p. 10-15.

Method determines the amount of Ni picked up by nickel dipping prior to application of porcelain enamel. This amount varies with the type of steel.

7b-223. Shop Processing of Titanium Enamels Direct to Titanium Steels. John L. Lannan. *Enamelist,* v. 25, Nov. 1948, p. 32-38.

Previously abstracted from *Better Enameling,* v. 19, Nov. 1948, p. 6-7, 26-27. See item 7b-217, 1948.

7b-224. Pickle and Mill Room Practice and Procedure for Application of Titanium Enamel Direct to Titanium Steel. John C. Swartz. *Enamelist,* v. 25, Nov. 1948, p. 39, 42-48.

Previously listed from *Better Enameling,* v. 19, Nov. 1948, p. 12-15, 29. See item 7b-218, 1948.

7b-225. Application of Cover Coats Directly on Titanium Steel; Zirconium and Other Types. M. E. McHardy. *Enamelist,* v. 25, Nov. 1948, p. 49-53.

Previously abstracted from *Finish,* v. 5, Nov. 1948, p. 39-40. See item 7b-202, 1948.

7b-226. Special Steels and Their Preparation for Enameling. (Excerpt.) Frank R. Porter. *Enamelist,* v. 25, Nov. 1948, p. 54-59.

Reviews the above.

7b-227. Evaluation of Pickling Inhibitors from the Standpoint of Hydrogen Embrittlement. II. Acid Pickling of Carbon Steel. C. A. Zapffe and M. E. Haslem. *Wire and Wire Prod-*

ucts, v. 23, Nov. 1948, p. 1048-1053, 1080-1082.

Pickling of mild steel in H_2SO_4. 15 reagents were studied, including 13 of the more widely used commercial inhibitors, one inhibitor base, and one reagent specially designed to prevent embrittlement. Seven of the reagents studied failed to prevent embrittlement regardless of concentration; four others failed to prevent embrittlement within their proprietary ranges, and four satisfactorily prevented embrittlement throughout their proprietary ranges. Of the latter four inhibitors, only the specially designed reagent represses embrittlement during pickling of stainless steel.

7b-228. Approximate Tables to Use for Drawing-up Hot Dip Galvanizing Pot Specifications. Part III. (Concluded.) Wallace G. Imhoff. *Industrial Gas,* v. 27, Nov. 1948, p. 10-12, 23-25.

Final installment gives examples showing how tables and graphs previously presented are used, and why the best operating results cannot be had from pots that are out of production balance.

7b-229. Shot Blasting Replaces Pickling on Some Steel Cleaning Applications. Kenneth Rose. *Materials & Methods,* v. 28, Nov. 1948, p. 72-75.

Methods, equipment, and applications.

7b-230. Preventing Salt-Water Corrosion. Thomas A. Dickinson. *Organic Finishing,* v. 9, Nov. 1948, p. 9-11.

Use of organic coating materials by the U. S. Navy.

7b-231. Sodium Hydride Descaling of Stainless and Clad Steels. John S. Morris. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 71-79; discussion, p. 84-86.

First of two articles on descaling of stainless steel describes and illustrates new process and equipment recently installed by Lukens Steel Co.

7b-232. Immersion Gas Tube Process of Descaling Bar Steel. G. D. Muschlitz. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 80-83; discussion, p. 84-86.

Second of two articles on descaling of stainless steel describes and illustrates process used at Midvale Co.

7b-233. A Study of Primers for Ferrous Metals in an Atmospheric Exposure—Progress Report No. IV. *Paint, Oil and Chemical Review,* v. 111, Nov. 11, 1948, p. 130-131, 133-140.

Previously abstracted from *American Paint Journal,* v. 33, Nov. 6, 1948, p. 8, 10, 26, 28, 30; Nov. 9, 1948, p. 28, 30, 32. See item 7b-214, 1948.

7b-234. Mass Production Techniques in Plating Steel Auto Parts. *Iron Age,* v. 162, Nov. 18, 1948, p. 106-108.

Rapid, systematized operations for polishing and plating steel auto parts.

7b-235. A Continuous Furnace Enameling Plant for Refrigeration Products. Gerald Eldridge Stedman. *Finish,* v. 5, Dec. 1948, p. 19-22, 54.

Porcelain-enameling operations at new International Harvester plant in Evansville.

7b-236. Application of Cover Coat Enamel Directly to Steel. E. H. Shands. *Finish,* v. 5, Dec. 1948, p. 25-26, 46.

Background information, an outline of experiments and production tests, and some practical suggestions.

7b-237. Development of Porcelain Enameled Coatings on Metals for Navy Shipboard Service. Forrest R. Nagely and Joseph H. Chilcote. *Finish,* v. 5, Dec. 1948, p. 33-35, 48, 51.

Some of the problems involved in the above for application in a variety of places, including mufflers and bulkheads. Considerable work is necessary in the fields of flame-spray equipment, application techniques, and formulations. Emphasizes need for material having the lowest practical softening point.

7b-238. How to Prevent Defects in Porcelain Enameling Holloware. Part VIII. Blistering. F. A. Petersen. *Ceramic Industry,* v. 51, Dec. 1948, p. 69-70.

7b-239. Assembling and Enameling Auto Hub Caps. Herbert Chase. *Iron Age,* v. 162, Dec. 2, 1948, p. 114-116.

Plated front and back plates are pressed into the formed part; and a conveyer system then carries the hubs through enameling lines, each handling an average of 1700 parts per hr., and drying ovens.

7b-240. A Hydrogen Evolution Method for the Determination of the Coating Weight of Galvanized Sheets. D. J. Swaine. *Analyst,* v. 73, Sept. 1948, p. 504-505.

Coating weight is determined by measuring the volume of hydrogen evolved by reaction with dilute HCl.

7b-241. Sheet and Tinplate Manufacture; The Pickling Process. (Concluded.) J. H. Mort. *Iron and Steel,* v. 21, Nov. 1948, p. 472-474.

Calculations and nomograms for acid consumption and control in sheet-mill pickling plants.

7b-242. Porcelain Enamel for Electrically Operated Products. II. (Con-

cluded.) Elias Jones. *Electrical Manufacturing,* v. 42, Dec. 1948, p. 98-103, 180, 182, 184.

Design considerations for parts to be enameled, a wide variety of applications, and properties required for each type of use. 31 ref.

7b-243. Two Flame-Cleaning Jobs—A Study of Costs. *Railway Engineering and Maintenance,* v. 44, Dec. 1948, p. 1283-1284.

Two identical truss bridges were flame-cleaned, one during extremely hot weather and the other in cool weather. A comparison of results revealed that the latter project was carried out at a considerably lower cost per square foot than the former. Reasons for the variation in costs, and other pertinent information.

7b-244. Automatic Spray Booth for Painting Steel Barrels. *Compressed Air Magazine,* v. 53, Dec. 1948, p. 303.

7b-245. Carnegie-Illinois Takes Wraps Off Newest Galvanizing Line at Irvin Works. *Iron Age,* v. 162, Dec. 9, 1948, p. 153.

Several improvements introduced.

7b-246. Molten Salt Bath Descaling Process Materially Reduces Production Time. S. G. Osborne and H. R. Spence. *Steel,* v. 123, Dec. 13, 1948, p. 106, 109-110, 124, 126, 129-130, 132.

Describes Hooker process. The mixture of fused salts has the ability to change surface scale and other impurities chemically, permitting their removal in dilute acid in 0.1 to 0.01 of the usual pickling time with no measurable effect on the underlying metal. How existing baths may be converted; chemistry involved in the process itself and the quench.

7b-247. Finishing Steel for Decorative and Protective Purposes. Reid L. Kenyon. *Yearbook of the American Iron and Steel Institute,* 1947, p. 597-624; discussion, p. 625-627.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York May 21-22, 1947.) See item 7-204, 1947.

7b-248. Mechanized Malleable Foundry Finishing and Inspection. D. F. Sawtelle. *American Foundrymen's Assoc., Preprint* No. 47-24, 1947, 4 pages.

Previously abstracted from *American Foundryman,* v. 11, June 1947, p. 44-46. See item 7-257, 1947.

7b-249. Malleable Iron Finishing. E. M. Strick. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 510-513; discussion, p. 514-515.

Importance of design to minimize finishing costs, and of proper finishing procedures. Different finishing methods and their applicabilities, and also inspection procedures. See item 7-150, 1947.

7b-250. Uber die Witterungsbeständigkeit von phosphatiertem Stahl. (The Weathering Resistance of Phosphated Steel.) Gerhard Schikorr. *Metalloberfläche.* v. 1, Aug. 1947, p. 188-190.

Results of extensive research done to compare the effectiveness of different commercial phosphating agents, including one cold process agent.

7b-251. Mechanismus der Pigmentierung. (The Mechanism of Pigmentation.) H. Wagner. *Archiv fur Metallkunde,* v. 1, Oct. 1947, p. 448-452.

Literature on use of paints and similar surface coatings shows little agreement as to fundamental mechanisms. The electrochemical effect between various pigments and iron was studied and it was concluded that it is of little importance. Recommends that special attention be paid to the water content, and content of electrolyte in the pigment and binder.

7c—Nonferrous-Base Metals

7c-1. Tinning Manganese Bronze. I. R. Valentine. *Steel,* v. 122, Jan. 12, 1948, p. 68-70.

Difficulties encountered in the production of sand-cast bearings were overcome by investigating specifications, checking components for zinc equivalence and then recommending production of units according to analyses that more rigidly define zinc-equivalent elements.

7c-2. Report on Sodium Silicate Cleaners. A. B. Middleton. *Die Castings,* v. 6, Jan. 1948, p. 65, 68-69.

Sodium silicates, when used to clean zinc materials prior to copper plating, have often been accused of leaving a film on the work which, it is claimed, causes the subsequent copper plate to be nonadherent. Experimental work by Hazel and Stericker has shown that when the right type of silicate is used under properly controlled conditions, satisfactory results can be obtained.

7c-3. Synthetic Enamels for Insulation of Copper Wire. C. R. Pye. *Plastics* (London), v. 11, Dec. 1947, p. 625-629.

A review. 29 ref. (To be continued.)

7c-4. La Couche de Phosphatation; son Aspect, son Epaisseur. (The Phosphate Layer; Its Appearance and Its Depth.) E. Jaudon. *Métaux et Corrosion,* v. 22, July 1947, p. 121-124.

A metallographic study of the structure of zinc phosphate and manganese phosphate layers.

7c-5. Cleaning Nonferrous Metals With Sodium Hydride. H. L. Alexander. *Wire and Wire Products,* v. 23, Jan. 1948, p. 35-41, 96-97; discussion, p. 62-63.

Development of the process, recommended procedures, equipment, and applications. (Presented at Wire Association Annual Convention, Chicago, Oct. 1947.)

7c-6. Speed Production of Protective Wire Coating Through Immersion Melting System. Charles W. Ange. *Wire and Wire Products,* v. 23, Jan. 1948, p. 47, 81-82.

Kemp immersion-fired melting-pots have greatly accelerated production of Okoloy protective coating for insulated copper conductors. Equipment and procedures.

7c-7. Application of Organic Finishes to Zinc Alloys. R. Mansell. *Modern Industrial Press,* v. 10, Jan. 1948, p. 6, 8.

Recommended procedures.

7c-8. Production Clinic for Finishing Die Castings. *Die Castings,* v. 6, Feb. 1948, p. 57-59.

Cleaners for zinc die castings and preparing aluminum for organic finishes. 14 ref.

7c-9. Synthetic Enamels for Insulation of Copper Wire. (Concluded.) C. R. Pye. *Plastics* (London), v. 12, Jan. 1948, p. 21-24.

Second and concluding installment of review contains 31 additional references.

7c-10. How to Finish Copper and Copper Alloys. R. W. Belfit, Wm. E. Baulieu, E. W. Lovering, and B. H. McGar. *American Machinist,* v. 92, Feb. 26, 1948, p. 95-106.

Methods and practices used in industry for deburring, polishing, buffing, cleaning, pickling, surface preservation, and decoration. Metals to which the information applies are copper, brasses, special brasses, aluminum bronzes, silicon bronzes, phosphor bronzes, manganese bronzes, nickel silvers, and Cu-Ni alloys.

7c-11. Small-Angle X-Ray Scattering From Metal Deposits Made by Evaporation. Benjamin Carroll. *Journal of Chemical Physics,* v. 16, Feb. 1948, p. 153-154.

Aluminum and copper deposits produced at 10^{-2} and 10^{-4} mm. by means of Debye-Scherrer and small-angle diagrams were examined. It was found that the black deposits exhibited marked small-angle scattering of X-rays and bright deposits did not; however, the Debye-Scherrer diagrams were substantially alike regardless of wide variations in reflectivity of the metal surface toward white light.

7c-12. The Evaporation of Gallium. S. K. Haynes. *U. S. Atomic Energy Commission,* MDDC-1604, April 2, 1947, 3 pages.

Laboratory technique developed for vapor deposition of gallium.

7c-13. Production Clinic for Finishing Die Castings. *Die Castings,* v. 6, April 1948, p. 63-64, 66-67.

Lacquers as finishing materials for die-cast products; copper strike for zinc die castings; anodizing aluminum alloys; surface treatment for magnesium; and extraction methods applied to analysis of electroplating baths.

7c-14. Chromating of Zinc. C. D. Leonard. *Electroplating,* v. 1, April 1948, p. 241-246.

Existing practice and latest developments.

7c-15. Vapor Blasted Grain for Lithographic Plates. E. G. Carlson. *National Lithographer,* v. 55, Feb. 1948, p. 39, 106.

Results obtained with zinc plates.

7c-16. Recherches Preliminaires Effectuees a l'Aide du Radio-Zinc 65. (Preliminary Research Accomplished With the Aid of Radioactive Zinc 65.) Ch. Haenny and P. Mivelaz. *Helvetica Chimica Acta,* v. 31, March 15, 1948, p. 633-642.

Considerable valuable information was obtained concerning the mechanism of surface reactions of zinc, the deposition of Zn and Au or Pt, and the separation of Cu from Zn by electrolysis.

7c-17. Phosphate Treatments for Zinc Surfaces. E. E. Halls. *Metallurgia,* v. 37, April 1948, p. 299-305.

Test results with respect to adhesion over periods up to one year obtained on various forms of zinc to which several different types of phosphate treatment had been applied.

7c-18. Improving the Adhesion of Organic Finishes Over Zinc Plate. Roland E. Kohl. *Materials & Methods,* v. 27, May 1948, p. 83.

Use of a chromate dip prior to application of the organic finish, for parts and equipment to be subjected to severe conditions of temperature change and humidity.

7c-19. Barrel Burnishing Methods. *Die Castings,* v. 6, June 1948, p. 64, 66-67.

Materials, methods, and case histories for Zn or Al die castings.

7c-20. Ridge Formation on Tin-Plate. A. Hamelain. *Sheet Metal Industries,* v. 25, June 1948, p. 1125-1126, 1140.

Mechanism of formation of ridges and possible method of prevention.

7c-21. The Deposition of Tantalum and Columbium from Their Volatilized Halides. C. F. Powell, I. E. Campbell, and B. W. Gonser. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 258-265.

General conditions for obtaining adherent, ductile, nonporous coatings of Ta and Cb by hydrogen reduction of their pentachlorides. Some of the chemical and physical properties and micrographic and X-ray diffraction studies of a few deposits. 12 ref.

7c-22. Pickling Monel Metal. Edward Rosen and George Black. *Materials & Methods,* v. 27, June 1948, p. 105.

7c-23. Grinding, Polishing and Buffing of Monel. Edward Rosen. *Materials & Methods,* v. 27, June 1948, p. 107.

7c-24. Stripping Rhodium Plate; Methods of Removal from Nickel-Plated Brass or Copper. M. Shapiro. *Metal Industry,* v. 72, June 4, 1948, p. 462, 466. Condensed from a recent issue of *Metal Finishing.*

Two successful methods are described.

7c-25. Chemical Colouring; A Decorative Finishing Treatment for Zinc-Base Alloys. W. C. Coppins. *Metal Industry,* v. 72, June 11, 1948, p. 482.

Process developed using a molybdate solution, which results in a mottled surface showing interference colors. Similar effect can be obtained on Al alloys.

7c-26. Acidic Emulsion Cleaner for Zinc Base Diecastings. *Iron Age,* v. 161, June 17, 1948, p. 79.

Has brought cost savings and the virtual elimination of rejects due to blistering, on baking, of the plate from the base metal in electroplating.

7c-27. Die Castings Must Be Clean. I. A Compendium of Cleaning Cycles Proved in Present-Day Production Practice. Arthur P. Schulze. *Products Finishing,* v. 12, July 1948, p. 26-28, 30, 32, 34, 36, 38, 40, 42, 44, 46.

18 references.

7c-28. Paint Baking of Die Castings by Infra-Red. *Die Castings,* v. 6, July 1948, p. 63-64.

Use by Syncro Saw Corp., Rochester, Mich.

7c-29. The Adhesion of Enamel Finishes to Electro-Plated Cadmium Coatings. E. E. Halls. *Metallurgia,* v. 38, June 1948, p. 75-78.

Extensive laboratory tests were conducted on cadmium-plated steel panels having various types of enamel finish and on which the cadmium was given various chemical treatments prior to enameling.

7c-30. A Study of Ceramic Coatings for High-Temperature Protection of Molybdenum. D. G. Moore, L. H. Bolz, and W. N. Harrison. *National Advisory Committee for Aeronautics, Technical Note* No. 1626, July 1948, 31 pages.

Specimens of molybdenum are covered with a protective ceramic coating and then given tests which include heating at constant temperature in an air atmosphere, heating in a gas-oxygen flame, thermal-shock tests, and service testing in the blast of ram-jet engines. Oxidation of molybdenum is greatly retarded by the best of the coatings. Short-time (10 to 45 min.) protection of molybdenum in oxidizing atmospheres at gas temperatures up to 3500° F. is possible.

7c-31. Korrosion phosphatierter Feinzinklegierungen durch Feuerlöschmittel. (Corrosion of Phosphated High-Grade Zinc Alloys by Fire-Extinguishing Liquids). R. Beythien. *Archiv fur Metallkunde,* v. 1, June 1947, p. 286-288.

Experiments for nine commonly used fire-extinguishing solutions or liquids, show that, in general, phosphating (bonderizing) gives less effective protection than chromizing. Some bonderized samples were found to be less corrosion resistant than unprotected samples. Use of lacquer coatings is suggested.

7c-32. The Preparation and Optical Properties of Gold Blacks. Louis Harris, Rosemary T. McGinnies, and Benjamin M. Siegel. *Journal of the Optical Society of America,* v. 38, July 1948, p. 582-589.

The optical properties of gold smokes deposited on cellulose nitrate films under different experimental conditions. Conditions of pressure, gas purity, rate of evaporation, and distance between source and deposition surface giving the highest infrared absorption per unit mass were found. The thermal mass required for high infrared absorption is small compared to the thermal masses of other receivers used for infrared measurements. The particle size and particle distribution of the gold smokes deposited under different experimental conditions were investigated with the electron microscope.

7c-33. Deposition of Nickel and Cobalt by Chemical Reduction. Abner Brenner and Grace Riddell. *British Chemical Digest,* v. 2, July 1948, p. 322-325.

The rate of deposition in the acid solution is virtually unaffected by the concentration of the reactants, and in the alkaline solution is affected only by the concentration of the hypophosphite and not by that of the nickel. Therefore, the reaction does not follow a simple course, but undergoes intermediate steps. Attempts to explain the reaction by one of two hypotheses neither of which is applicable to all the phenomena.

7c-34. Pre-Treatments for Galvanized Iron Prior to Painting. Rick Mansell. *Organic Finishing,* v. 9, Aug. 1948, p. 38-40.

Various methods, including weathering, mechanical sanding, blasting, and wire brushing; acid etching; plating, and deposition of inorganic films such as sodium silicate.

7c-35. Die Castings Must Be Clean. III. A Compendium of Cleaning Cycles Proved in Present-Day Production Practice. Arthur P. Schulze. *Products Finishing,* v. 12, Sept. 1948, p. 40, 42, 44, 46, 50, 52, 54, 58, 60.

16 references.

7c-36. Electrostatic Spraying for Rapid Painting. D. A. Hilliard. *Die Castings,* v. 6, Oct. 1948, p. 48-49, 58.

Use for finishing die-cast household scales.

7c-37. Dry-Tumbled Finishes. *Die Castings,* v. 6, Nov. 1948, p. 47-50, 69-70.

Materials, methods, equipment, and characteristics, especially as applied to die castings. Data presented are based on the "Tumb-L-Matic" process.

7c-38. High-Temperature Attack of Various Compounds on Four Heat Resisting Alloys. D. G. Moore, J. C. Richmond, and W. N. Harrison. *National Advisory Committee for Aeronautics, Technical Note* No. 1731, Oct. 1948, 19 pages.

Certain common ceramic-coating ingredients react with above alloys, thereby limiting their life. 61 compounds, logically useful in such coatings, were tested by placing in contact with Hastelloy B, S-816, S-590, and Haynes Stellite No. 21 and heating in air for 17 hr. at 1500° F. Hastelloy B was much more susceptible to attack than the other alloys. The data indicate that it should be possible to prepare ceramic-coating compositions for high-molybdenum alloys which will prolong their life under conditions which now produce early deterioration.

7c-39. Electron Diffraction Study of Particle Size in Thin Bi Films Deposited by Evaporation In Vacuum. C. T. Keogh and A. H. Weber. *Journal of Applied Physics,* v. 19, Nov. 19, 1948, p. 1077-1082.

Films were studied by the method of microphotometer density-curve analysis to determine changes of the film structure with aging and with increase in thickness of the films. Analysis indicates that the very thin films grow rapidly upon aging into larger crystals. The very thinnest film (about 5 atom layers thick) analyzed exhibited an initial increase in particle size followed by a decrease upon aging. Increase in particle size with increase in thickness.

7c-40. The Action of "Chromic Acid" on Zinc Coatings. D. J. Swaine. *ASTM Bulletin,* Oct. 1948, p. 52.

Results of the action of hot chromic acid solution on electrolytic zinc, galvanized sheet, and galvanized wire.

7c-41. Vapor Blast for Satin Finish. Herbert Chase. *Products Finishing,* v. 13, Nov. 1948, p. 58-60.

How blasting operation results in pleasing contrast between dull and bright areas on Chevrolet radio-grille zinc-alloy die casting.

7c-42. Uber den Oberflächenschutz hochschmelzender Metalle zur Verbesserung der Zunderbeständigkeit bei hohen Temperaturen. (Surface Protection of High-Melting Metals to Increase Their Scaling Resistance at High Temperatures.) Helmut Buckle. *Metallforschung,* v. 1, Sept. 1946, p. 81-86.

Surface protection of W, Mo, Cb, and Ta. Several possible methods were investigated, including dip coating, vapor deposition, sintering, and chemical deposition of a protective coating. Dip coating or vapor deposition of platinum gives good protection. Application of a coating of certain oxides gives the best results, especially if a sintered oxide-metal mixture is deposited on the sintered-metal object, and in turn coated with sintered ceramic material.

7c-43. Uber das Lackieren von Zink. (The Lacquering of Zinc.) H. Weise. *Archiv fur Metallkunde,* v. 1, Oct. 1947, p. 464-465.

A brief but fairly comprehensive study of the problems involved. Chemical and physical methods for preparing the surfaces. Different types of lacquers are evaluated with regard to their suitability for the purpose.

7d—Lightweight-Base Metals

7d-1. Surface Treating Aluminum for Corrosion Resistance and Finish Adhesion. *Modern Metals,* v. 3, Dec. 1947, p. 16-18.

Alodine chemical process for inactivating the surface of aluminum products in preparation for finishing them; its applications by Minneapolis-Honeywell in manufacture of controls.

7d-2. Latest Methods for Cleaning Aluminum Prior to Painting. S. H. Phillips. *Automotive Industries,* v. 98, Jan. 15, 1948, p. 42-43, 45, 54.

Methods and equipment used by Douglas Aircraft Co.

7d-3. La Peinture de l'Aluminium. (Painting of Aluminum.) Part II. (Concluded.) J. J. Meynis de Paulin. *Revue de l'Aluminium,* v. 24, Nov. 1947, p. 325-331.

Properties and compositions of primers and methods of adding pigments. Variations in the final step, according to whether the aluminum object is to be used indoors or out.

7d-4. Some Swedish Opinions on Paints and Paint Constituents. *Paint Manufacture,* v. 17, Dec. 1947, p. 426-427.

Six abstracts from *Farg och Fernissa* (Paint and Varnish) on: turpentine and white spirit; boat paints; influence of paints on safety and efficiency; chemical resistant varnishes; paint as protection for light alloys; and black iron oxide as a pigment.

7d-5. Twin Coach Develops Special Methods for Painting Aluminum Buses. Walter Rudolph. *Automotive Industries,* v. 98, Feb. 1, 1948, p. 40-41, 66.

7d-6. Protective and Decorative Finishes for Aluminum. Ray Swan and N. P. Ruther. *Products Finishing,* v. 12, Feb. 1948, p. 32, 34, 36, 38, 40.

General recommendations for surface preparation and application of finishes, and their selection.

7d-7. Chemical Surface Treatment for Aluminum Alloy Die Casting. *Machinery* (London), v. 72, Jan. 29, 1948, p. 155-156.

Recommended procedures.

7d-8. Dyeing of Anodized Aluminum. S. Howard Withey. *Electroplating,* v. 1, Feb. 1948, p. 143.

Recommended procedures for the anodizing as well as the dyeing.

7d-9. Priming Aluminum. *Metal Industry,* v. 72, Feb. 20, 1948, p. 145.

Selection of the proper primer for use prior to painting.

7d-10. Polishing and Buffing Aluminum. C. J. Hinton. *Plating,* v. 35, March 1948, p. 248-250.

Differences between polishing and buffing Al and other metals. Buffing of soft Al surfaces.

7d-11. Power Brushing of Light Weight Metals. *Production Engineering & Management,* v. 21, March 1948, p. 71.

Trend toward increased use of power brushing as a light-metals parts-finishing operation.

7d-12. Anodizing and Dyeing; Practical Experiences and Final Conclusions. K. E. Langford. *Electroplating,* v. 1, March 1948, p. 215-218 A condensation.

Technical difficulties encountered in setting up a shop for anodizing and dyeing of aluminum and its alloys, and their solutions. Practical aspects, especially for the dyeing process, in which a wide variety of colors are applied.

7d-13. Heat Resistant Silicone Finishes. E. J. Bromstead and M. A. Glaser. *Organic Finishing,* v. 9, March 1948, p. 21-26.

For coating of aluminum. Comparative heat resistances of silicone and oleoresinous finishes on sheet Al. Properties of the former in contact with various chemical solutions and commercial products, with regard to exposure to weathering and to high humidity, and with regard to flexibility and resistance to impact and abrasion. Application, surface pretreatments and uses.

7d-14. Machines for Fabricating Enameled Aluminum Roofing. *Sheet Metal Worker,* v. 39, March 1948, p. 112.

Production at Robbins Metals, Spokane, Wash.

7d-15. Wire Brushing Provides Finish for Light Metal Parts. *Products Finishing,* v. 12, April 1948, p. 98, 100.

Use by a railroad supplier manufacturing heavy-duty air brakes.

7d-16. Power Brush Uses Increased in Light Metal Finishing. *Steel,* v. 122, April 12, 1948, p. 114.

A few new uses in the plant of a railroad supplier for production as well as special jobs.

7d-17. Painting Aluminum Structures. Robert I. Wray and Junius D. Edwards. *Paint, Oil and Chemical Review,* v. 111, April 15, 1948, p. 16, 46, 48, 50, 53-54.

Recommended procedures for surface preparation and for paint selection and application. Performances of different paints on different Al alloys, and under different service conditions.

7d-18. Surface Oxide Removal Important in Final Processing of Aluminum. D. E. Durkin. *Materials & Methods,* v. 27, April 1948, p. 82-85.

Operations of cleaning and deoxidation prior to welding or anodizing. Presents data on surface resistance vs. time of exposure, immersion time vs. surface resistance on aging, and optimum treating time at a definite concentration of various solutions.

7d-19. Brunak Controls Oxidation on Aluminum Plates. Michael H. Bruno and Paul J. Hartsuch. *Modern Lithography,* v. 16, April 1948, p. 51, 53.

Modification of "Cromak" surface treatment for Al plates. HF is substituted for H_2SO_4, resulting in much greater protection against oxidation. Recipe for the Brunak solution and directions for its use as well as for platemaking on "Brunaked" aluminum.

7d-20. Process Sheet for Dichromate Treatment of Magnesium, George Black. *American Machinist,* v. 92, May 6, 1948, p. 135.

7d-21. Preparation of Wrought Aluminum for Painting. R. H. Prislin. *Enamelist,* v. 25, April 1948, p. 7-9, 61-62, 64, 67.

Classification charts of aluminum alloy sheet and plate. Physical treatments, solvent precleaning, and chemical cleaning. (To be continued.)

7d-22. Painting Aluminum. A. J. Ward. *Electroplating,* v. 1, May 1948, p. 309-314.

Solvent, chemical and electrolytic methods of cleaning and degreasing and mechanical and chemical methods of etching or slightly roughening the surface prior to painting or enameling.

7d-23. Phosphate Coating of Aluminum and Polymorphism of Chromium Phosphate. G. L. Clark and A. P. Tai. *Science,* v. 107, May 14, 1948, p. 505.

Results of chemical and X-ray-diffraction analysis of a coating obtained by treatment with a chromic acid and phosphate solution. A whole series of aluminum phosphates representing polymorphism, various hydrates, and phosphoric acid forms was found. Additional lines correspond to aluminum oxide and aluminum fluoride, but the chromium phosphate producing the green color is evidently amorphous. Results of an intensive investigation of chromium phosphates in an effort to identify this compound.

7d-24. Le Decapage Au Framanol; Nouveau Procede de Preparation des Surfaces et de Protection de l'Aluminium. (Pickling with Framanol; A New Process for Surface Preparation and Protection of Aluminum.) Jean Frasch. *Revue de l'Aluminium,* v. 25, March 1948, p. 84-89.

Use of a deoxidizing and degreasing solution for prewelding or preanodizing. Contact-resistance measurements and comparative effects of other pickling solutions.

7d-25. Brunak Anti-Oxidation Surface Treatment for Aluminum. Michael H. Bruno and Paul J. Hartsuch. *Printing Equipment Engineer,* v. 76, May 1948, p. 36, 42.

Previously abstracted from *Modern Lithography,* v. 16, April 1948, p. 51-53. See item 7d-19, 1948.

7d-26. Preparation for Painting of Aluminum Sheet and Plate. Part II. Chemical and Electrochemical Surface Treatments. R. H. Prislin. *Enamelist,* v. 25, May 1948, p. 24-31.

A descriptive review. 14 ref.

7d-27. Anodic Oxide Coatings; the Influence of Sealing Treatments on Protective Value. L. Whitby. *Metal Industry,* v. 72, May 14, 1948, p. 400-403.

Results of a comparative evaluation by salt-spray testing of the relative protective values of anodic oxide coatings on a fully heat treated duralumin-type alloy when subjected to various sealing treatments. 15 ref.

7d-28. Providing Aluminum With a Flexible Rust-Protective Coat and Paint Base. Norman P. Gentieu. *Machine and Tool Blue Book,* v. 44, June 1948, p. 164-166, 168, 170, 172, 174, 176.

"Alodizing" process.

7d-29. Surface Finishing of Aluminum and Its Alloys. *Aluminium Development Association* (London), *Information Bulletin* No. 13, Dec. 1947, 43 pages.

Cleaning and degreasing; mechanical, chemical, and electrochemical methods; and use of paint. Working processes such as shot blasting, pattern rolling, and hammer finishing; and also vitreous enameling and radiant-heat drying. 25 ref.

7d-30. Aluminum Coating of Steel. Armand Di Giulio. *Light Metal Age,* v. 7, June 1948, p. 8-9.

Procedure using electric salt-bath furnaces.

7d-31. Non-Blister Bake Finish on Aluminum Castings. A. P. Lehmann. *Industrial Finishing,* v. 24, June 1948, p. 51-52, 54.

The cause and effect of blistering of baked-on finishes; and an efficient, economical and practical method of eliminating blisters without special pretreatment, other than degreasing if necessary.

7d-32. Tin Coating Aluminium; Surface Preparation for Electroplating, Painting or Plastic Bonding. *Electro-*

plating, v. 1, June 1948, p. 408-409.

A patented process for producing a firmly-adherent tin coating on aluminum by chemical means which protects the metal during storage and affords a highly satisfactory surface on which to electrodeposit other metals or to apply paints, enamels, rubber, plastics, and cements.

7d-33. Aluminum Mirrors the Stars. *Aluminum Bulletin,* v. 1, June, 1948, p. 1.

Vacuum deposition of Al on the surface of the disk of the new 200-in. Mt. Palomar telescope in California.

7d-34. Painting Aluminum Structures. Robert I. Wray and Junius D. Edwards. *Official Digest,* April 1948, p. 315-325.

Previously abstracted from *Paint, Oil and Chemical Review,* v. 111, April 15, 1948, p. 16, 46, 48, 50, 53-54. See item 7d-17, 1948.

7d-35. Process Sheet for Zinc-Immersion Treatment. George Black. *American Machinist,* v. 92, July 15, 1948, p. 135.

The zinc-immersion process is a method for applying an extremely thin coating of zinc on the surface of aluminum and its alloys, to facilitate subsequent electroplating.

7d-36. Economical Cleaning of Aluminum Slat Stock for Venetian Blind Manufacture. *Modern Metals,* v. 4, July 1948, p. 24-26.

A rapid and economical method for cleaning and coating aluminum slat stock in preparation for painting. Treatment is based on coating with a green material known as "Alodine".

7d-37. Aluminum Spray Coating to Protect Welded Units. Merrill A. Scheil. *Metal Progress,* v. 54, July 1948, p. 64.

Properties and advantages.

7d-38. Surface-Finishing Magnesium Parts. *Modern Metals,* v. 4, Aug. 1948, p. 12-15.

The tumbling-finishing method, known as Roto-Finishing, as well as the equipment used, types of chips and compounds employed. Procedures employed for grinding, deburring, polishing, britehoning and coloring. Some of the known advantages for mechanical finishing.

7d-39. The Influence of Sealing Treatments on the Protective Value of Anodized Coatings. L. Whitby. *Metal Finishing,* v. 46, Sept. 1948, p. 70-74.

Previously abstracted from *Metal Industry,* v. 72, May 14, 1948, p. 400-403. See item 7d-27, 1948.

7d-40. Aluminum Alloy Castings. (Continued.) Floyd A. Lewis. *Foundry,* v. 76, Sept. 1948, p. 90-93, 212, 214, 216, 218, 220.

Recommended practices in cleaning and finishing aluminum alloy castings.

7d-41. Preparation of Aluminum for Painting. Rick Mansell. *Aero Digest,* v. 57, Oct. 1948, p. 46-47, 118-119.

Results of experiments which indicate that surface roughening by sand blasting or otherwise is not always the best way. Various chemical and electrochemical surface treatments were evaluated.

7d-42. Aluminum Cleaning Methods. Alfred H. Pope. *Metal Finishing,* v. 46, Oct. 1948, p. 75-80, 125.

Specific methods—vapor degreasing, solvent cleaning, emulsion cleaning, alkaline cleaners, pickling, and etching. Cleaning before spot welding; cleaning before electroplating, by zinc immersion; treatment prior to anodizing; treatment prior to burnishing; brightening prior to buffing; cleaning before bonderizing; preparation for porcelain enameling; producing a frosted finish; removal of an applied oxide coating; and removal of welding flux. 12 ref.

7d-43. Glycerine in Aluminum Treatments. Milton A. Lesser. *Light Metal Age,* v. 6, Oct. 1948, p. 22, 24-25.

Various commercial and patented methods in which glycerine is used in both chemical and electrolytic finishing processes.

7d-44. Process Sheet For Chrome-Pickle Treatment. George Black. *American Machinist,* v. 92, Oct. 21, 1948, p. 141.

Treatment applied to magnesium to protect against tarnish and corrosion during handling and storage.

7d-45. Metal Finishing Process Information Sheets. I and II. George Black. *Product Engineering,* v. 19, Nov. 1948, p. 157, 159.

The following treatments for aluminum; chromic acid anodizing process, alodizing, alumilite process, bonderite 170, Alrok, Alumox, Alumatreet, and Alzak.

7d-46. Priming Paints for Light Alloys. J. G. Rigg and E. W. Skerrey. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 69-80.

The protection afforded to aluminum and magnesium alloys by various paint primers is being investigated in rural, industrial, and marine atmospheres. Results have so far shown that iron oxide primers

provide useful protection, whereas red lead primers are definitely harmful on aluminum, and especially so on magnesium. Primers pigmented with zinc chromate and zinc tetroxychromate are providing most effecient protection to light alloys.

7d-47. Finishing Halliburton Aluminum Travel Cases. Fred M. Burt. *Industrial Finishing,* v. 25, Nov. 1948, p. 78-80, 84, 86, 90.

Surface preparation and coating.

7d-48. The Chemical Colouring of Aluminium. Frank A. Allen. *Light Metals,* v. 11, Nov. 1948, p. 608-609.

Theory, practice and possibilities.

7d-49. Metal Finishing Process Information Sheets. III. Aluminum. George Black. *Product Engineering,* v. 19, Dec. 1948, p. 159.

Phosphoric acid anodic process; alumon process; zincate process; and "sat-n-dip" process.

7d-50. Wax Coating Protects Street Lighting Reflectors. Walter Skove and Anthony Nichols. *Electric Light and Power,* v. 26, Dec. 1948, p. 98, 100.

Tests under severe atmospheric conditions demonstrate that appliation of wax coating to polished surfaces of aluminum street-lighting reflectors permits periodic cleaning by wiping with a dry cloth to restore reflection efficiency.

7d-51. How Glass Reflectors Are Made Through Vaporization of Aluminum. Kenneth Rose. *Materials & Methods,* v. 28, Dec. 1948, p. 85-87.

Procedures and superior properties of such reflectors.

7d-52. Oberflächenschutzverfahren fur Magnesium-Legierungen. (Methods of Protecting the Surfaces of Magnesium Alloys.) G. Siebel. *Metalloberfläche,* v. 1, Sept. 1947, p. 213-220.

The various chemical and electrochemical processes and the properties of the different protective films.

SECTION VIII

ELECTRODEPOSITION AND ELECTROFINISHING

8-1. **Anodes—VII; Rolled, Forged, and Sintered Nickel Alloys.** E. R. Thews. *Metal Industry,* v. 71, Nov. 7, 1947, p. 388-389; Nov. 21, 1947, p. 427-429.

8-2. **Plating to Specification.** E. A. Ollard. *Metal Industry,* v. 71, Dec. 5, 1947, p. 462-464.

Recommended procedure for nickel deposition. (To be concluded.)

8-3. **Plating to Specification.** E. A. Ollard. *Metal Industry,* v. 71, Dec. 19, 1947, p. 503-504.

Recommended procedure for nickel deposition. (Concluded.)

8-4. **Thickness Standards for Nickel Electroplate.** George Black. *Product Engineering,* v. 19, Jan. 1948, p. 163.

Tabulates A.S.T.M., aircraft, automotive, and British standards.

8-5. **On the Amorphous and Crystalline Oxide Layer of Aluminum.** A. J. Dekker and W. Ch. Van Geel. *Philips Research Reports,* v. 2, Aug. 1947, p. 313-319.

Oxidation of anodized aluminum results in formation of a crystalline layer. Experiments show that this layer only fills up the holes of the amorphous Al_2O_3. Also, there is a correlation between the current density in oxalic acid and the porosity of the amorphous layer thus formed.

8-6. **The Cyanide Content.** J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 46, Jan. 1948, p. 61-62, 67.

How to make up various cyanide baths from data given in formulas. Meanings of the common terms in cyanide plating.

8-7. **Fluid Mechanics: Forgotten Factor in Electroplating. Part II.** Joseph B. Kushner. *Metal Finishing,* v. 46, Jan. 1948, p. 63-67.

Discusses: surface tension; adhesion, cohesion, and wetting; surface tension in metal cleaning; surface tension and dragout; surface tension and pitting and nodules; surface tension and bright plating.

8-8. **Rapid Small Parts Handling Features Buick Plating Setup.** Herbert Chase. *Products Finishing,* v. 12, Jan. 1948, p. 16-18, 20, 22, 24, 26.

Bright zinc is applied to chassis parts both in automatic-barrel and racked-part lines. Cadmium plating and phosphating are done efficiently.

8-9. **Aufgaben und Probleme der Neuzeitlichen Elektrochemie. I. Die Kathodische Abscheidung der Metalle aus wässrigen Lösungen und ihre Praktische Anwendung in der Galvanotechnik. (Assignments and Problems of Modern Electrochemistry. Part I. Cathodic Deposition of Metals From Aqueous Solutions and Its Practical Application to Electrotechnique.)** Fr. Müller. *Chimia,* v. 1, Nov. 15, 1947, p. 213-223.

Progress in recent years; problems still to be solved. 194 ref.

8-10. **Notes on Nickel and Chromium Plating.** C. F. Nixon and R. C. Olsen. *Plating,* v. 35, Jan. 1948, p. 27-33, 95.

Depositing chromium over bright nickel plate in the same plating machine or, if a plating machine is not involved, without reracking through a sequence of still tanks. Cost-cutting advantages; technical difficulties.

8-11. **Electroforming—a Literature Review and a New Application.** W. H. Safranek, F. B. Dahle, and Charles L. Faust. *Plating,* v. 35, Jan. 1948, p. 39-49.

The status of electroforming; significant advantages; practical methods and procedures. A new process for the continuous automatic production of fountain-pen caps indicates possibilities for low-cost mass production of other consumer's goods. Results of a pilot-plant development. Classified bibliography contains patent references plus 65 journal references.

8-12. **Physical Properties of Electrodeposited Metals. Part I. Nickel. Section 1. Literature Survey.** A. Brenner and C. W. Jennings. *Plating,* v. 35, Jan. 1948, p. 52-58.

Results of A.E.S. Research Project No. 9. Bibliography arranged by year

of publication, including a subject index. 152 ref.

8-13. Some Technical Applications of the Electrolytic Polishing of Metals. R. E. Halut. *Sheet Metal Industries,* v. 25, Jan. 1948, p. 113-121, 124.

A review. 36 ref.

8-14. A New Surface Treatment for Magensium. A. L. Kohl and Herbert Waterman. *Iron Age,* v. 161, Jan. 22, 1948, p. 50-55.

Treatment consists of anodizing the parts in a hot, saturated, sodium carbonate solution. The treatment forms a white crystalline coating which is an electrical insulator and very resistant to abrasion. Tests indicate the value of the coating for corrosion resistance and also as a paint base. 10 ref.

8-15. Recent Developments in the Finishing of Zinc-Base Alloy Die Castings. Maurice R. Caldwell. *Plating,* v. 35, Feb. 1948, p. 135-140.

Results of experimental work and outdoor exposure tests on automobile hardware at Doehler-Jarvis Corp. Effects of variations in plating baths, thickness of plate, polishing and buffing procedures, are shown by photographs and photomicrographs.

8-16. Plating of Zinc-Base Alloy Die Castings. R. M. Wagner. *Plating,* v. 35, Feb. 1948, p. 141-144.

Plating of die castings for exterior automotive use. Based upon the methods and processes in use by the Guide Lamp Division of General Motors Corp. Generalizations regarding requirements for adequate protection are supported by the comments of several outstanding plating experts. Adhesion, protective properties, and appearance.

8-17. Causes of Failure of Plated Coatings in Automotive Service. E. A. Anderson and C. E. Reinhard. *Plating,* v. 35, Feb. 1948, p. 145-152.

Results of a thorough investigation of 71 plated zinc alloy die-cast parts, mostly from 1941 model cars with 5 years' service, from different locations, in order to permit comparisons among different atmospheric environments.

8-18. Electrodeposition of Tungsten Alloys. *Technical News Bulletin* (National Bureau of Standards), v. 32, Jan. 1948, p. 4-5.

Abstracted from "Electrodeposition of Tungsten Alloys Containing Iron, Nickel, and Cobalt," by Abner Brenner, Polly Burkhead, and Emma Seegmiller, *Journal of Research of the National Bureau of Standards,* v. 39, 1947, p. 351. See 8-172, R.M.L. v. 4, 1947 (*Metals Review,* Jan. 1948).

8-19. Zinc Alloy Die Castings—Quality, Design and Plating Procedures. L. A. J. Lodder. *Journal of the Electrodepositors' Technical Society,* v. 22, 1947, p. 199-205. (Reprint).

Zinc alloy die castings from the point of view of the electroplater. Procedure for copper plating is equally applicable whether bright or dull nickel is to follow the primary deposit of copper.

8-20. The Electrolytic Polishing of Metals. G. Tolley. *Metallurgia,* v. 37, Dec. 1947, p. 71-74.

A review. 42 ref.

8-21. Solution Purification; Continuous Low Current Density Electrolytic Unit. C. E. Heussner and L. M. Morse. *Metal Industry,* v. 72, Jan. 2, 1948, p. 6-8, 13.

Previously abstracted from "Continuous Electrolytic Solution Purification", *Monthly Review,* v. 34, Nov. 1947, p. 1243-1249. See 8-163, R.M.L., v. 4, 1947 (*Metals Review,* Dec. 1947).

8-22. Dépot Electrolytique de ThB et ThC sur Divers Métaux. (Electrodeposition of ThB and ThC on Various Metals.) André Coche. *Comptes Rendus* (France), v. 225, Nov. 17, 1947, p. 936-939.

The variation of critical potential with the nature of the support was studied for the electrodeposition of ThB on Au, Ag, Cu, Pt, and Ta; and of ThC on Au, Pt, and Ta.

8-23. Plating Chromium by Thermal Decomposition of Chromium Hexacarbonyl. B. B. Owen and R. T. Webber. *Metals Technology,* v. 15, Jan. 1948, T.P. 2306, 5 pages.

Results of preliminary experiments upon the plating of chromium from its carbonyl. Apparatus and technique used. 36 plating runs were made using mild-steel disks.

8-24. The Influence of Internal Stress on the Structure of Electrodeposits. M. R. J. Wyllie. *Journal of Chemical Physics,* v. 16, Jan. 1948, p. 52-64.

Properties of chromium electrodeposited from a standard chromic-acid electrolyte. It is shown that the data agree with the assumption that the preferred orientation found is the result of a slipping process, analogous to cold working, which occurs during deposition when internal contractile stress reaches a certain critical value. The type of orientation found also agrees with the theory. It is believed that (111) orientation is to be expected generally for body-centered cubic met-

als electrodeposited in a state of contractile stress, while (110) or (100) is to be anticipated for the face-centered type deposited with the same type of stress. The orientations of a number of electrodeposited metals are shown to agree with this hypothesis. Certain anomalies in the stress and orientation results for Ag, Ni, and Al deposits were studied experimentally, and the results explained on the basis of the above theory. The possible mechanism of internal-stress formation in electrodeposits. 37 ref.

8-25. **Rhodium Plating and Its Application to Reflectors.** A. H. Stuart. *Electroplating,* v. 1, Jan. 1948, p. 88-90, 102.

Phenomenon of reflectivity and results of some laboratory tests on the effect of exposure on the reflectivity of polished metal surfaces. Rhodium electroplating procedure.

8-26. **Laboratory Test and Equipment.** J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 46, Feb. 1948, p. 50-55.

Methods of testing and the equipment used by the electroplater. (To be continued.)

8-27. **Anodic Reactions of Aluminum and Its Alloys in Sulphuric and Oxalic Acid Electrolytes.** Ralph B. Mason and Charles J. Slunder. *Metal Finishing,* v. 46, Feb. 1948, p. 65-70.

Previously abstracted from *Industrial and Engineering Chemistry.* See item 8-177, R.M.L., v. 4, 1947.

8-28. **Electropolishing—a Survey.** Samuel Wein. *Metal Finishing,* v. 46, Feb. 1948, p. 71-77.

Recipes for make-up of a large number of electropolishing baths, as obtained from the literature. 57 ref.

8-29. **Nickel Plating.** *Metal Finishing.* v. 46, Feb. 1948, p. 83.

A tabulation of information useful in designating metallic surface treatments.

8-30. **Process Sheet for Cadmium Plating.** George Black. *American Machinist,* v. 92, Feb. 12, 1948, p. 145.

A flow chart.

8-31. **Physical Properties of Electrodeposited Chromium.** Abner Brenner, Polly Burkhead, and Charles Jennings. *Journal of Research of the National Bureau of Standards,* v. 40, Jan. 1948, p. 31-59.

The following properties of chromium, deposited under a wide variety of plating conditions, were measured: density, hardness, tensile strength, Young's modulus of elasticity, ductility, electrical resistivity, and stress in the deposit. The oxygen and hydrogen content were also determined, as well as effects of heat treaments up to 1200° C. on certain of these properties. Some work was done on the properties of Cr-Fe alloys deposited from modified chromic acid solutions. A relation between the hydrogen and oxygen content of the deposits was shown to exist, and the effect of the oxygen content on the physical properties was studied. 40 ref.

8-32. **Plating Zinc Die-Castings; Pretreatment Prior to Bright Nickel Deposition.** P. Berger. *Metal Industry,* v. 72, Jan. 30, 1948, p. 88-90.

Methods for preliminary treatment, an operational sequence suitable for rapid production plating, and methods for the prevention of undesirable phenomena, such as overcleaning. The inter-activity of zinc as a base metal for electrodeposited undercoatings such as copper and brass. (To be concluded.) (Presented at meeting of Electrodepositors' Technical Society.)

8-33. **Concerning Dense and Porous Cathodic Deposits of Cadmium and Manganese.** (In Russian.) O. Kudra and E. Gitman. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, July 1947, p. 605-612.

Decomposition voltages of Cd and Mn salt solutions were investigated using a modified method. Two decomposition potentials were obtained in cadmium salt solutions—the lower one corresponding to solid cadmium and the higher one, at an increased cathode current density, to porous deposits. Three decomposition potentials were obtained in Mn salt solution: the lower one corresponds to evolution of hydrogen, the intermediate one, to deposition of dense Mn, and the higher one to formation of porous deposits. Results prove that the formation of porous cathode deposits should be ascribed neither to the action of hydrogen nor to the formation of crystallization centers and the growth of single crystals, but is caused by the discharge of complex cations.

8-34. **Carbonate Anodizing of Aluminum Alloys. II. Anodization of Duralumin With Direct Current Over A Range of Concentrations and Temperatures.** (In Russian.) A. F. Bogoyavlenskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, July 1947, p. 613-619.

Results of a study to determine conditions for production of a film with maximum corrosion resistance. The method is applicable to commercial practice, since the quality

of the oxide film is not inferior to that of the sulphate method.

8-35. Variation of Resistance of Electrolytes With Form Size, and Arrangement of Electrodes. III. Combination of Flat and Cylindrical Electrodes. (In Russian.) V. P. Mashovets, V. V. Cherdyntsev, and M. V. Neustrueva. *Zhurnal Prikladnoi Khimii,* (Journal of Applied Chemistry), v. 20, July 1947, p. 660-669.

An equation is derived for the dependence of electrolyte resistance on interpolar distance. Experimental measurements show that the equation is sufficiently accurate for technical purposes for small interpolar distances. For large distances, an empirical correction requiring determination of resistance for any one distance is necessary.

8-36. Mechanism of Electrodeposition of Nickel. Part I. Ultramicroscopic Investigation of the Process. Part II. Role of Hydrogen in the Process of Electrodeposition of Metal. (In Russian.) G. S. Vozdvizhenskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Sept. 1947, p. 813-822.

In Part I, it is shown that, contrary to the assumptions of other investigators, no colloidal solutions or suspensions of basic compounds are formed in the region near the cathode. The mechanism of formation of basic Ni compounds on the cathode is explained. In Part II, the effect of hydrogen on structure and properties of the deposits was investigated. 26 ref.

8-37. Danger of "Masked Pores" and Methods for Their Determination. A. Glazunov. *Journal of the Electrodepositors' Technical Society,* v. 23, 1948, p. 9-13. (Reprint).

In certain cases, pores in electrodeposits are "bridged" by forming "masked pores", which are hard to detect, but which represent points at which failure will soon occur. An electrographic method of detection in which the specimen is made the anode, an aluminum plate the cathode, and a sheet of filler paper or cellophane moistened with a suitable reagent inserted between them. Appearance of colored spots after a delay of half a minute indicates the presence of masked pores.

8-38. Presidential Address; The Relation of Electrodeposition to Electrochemistry. G. E. Gardam. *Journal of the Electrodepositors' Technical Society,* v. 23, 1948, p. 1-4; discussion, p. 5-8. (Reprint).

Knowledge of theoretical electrochemistry has been much less helpful in the improvement of electrodeposition methods than would be expected. Reasons for this fact and ways in which more correlation may possibly be achieved in the future.

8-39. Electrodeposition of Lead From the Ethylbenzenesulfonate Bath. Frank C. Mathers and John F. Suttle. *Journal of the Electrochemical Society,* v. 93, Feb. 1948, p. 47-48.

A cheaper or more satisfactory lead plating and refining bath than the usual ones with fluoborate or fluosilicate would be desirable. Many different addition agents were tried, but none gave as good deposits as could be obtained from corresponding lead fluosilicate baths. The best results were with β-naphthol and glue, or goulac, or both.

8-40. Domestic Appliances; Choosing the Finish for the Job. A. Gellman. *Electroplating,* v. 1, Feb. 1948, p. 137-142.

The three main requirements: appearance, protective capacity, and durability. Recommended procedures for performance testing and for interpretation of results.

8-41. Lead Plating of Aluminum Bronze. *Electroplating,* v. 1, Feb. 1948, p. 151-152; discussion, p. 152. Condensed from paper by H. Silman.

Technique developed for a bronze bearing metal containing 10 to 12% Al. (Presented at meeting of Electrodepositors' Technical Society, London, Dec. 15, 1947.)

8-42. The Metallography of Electrodeposited Surfaces (Continued.) The Physics of Grinding and Polishing. Part II—Changes in Metal Surface Character During Machining, Grinding and Polishing. A. T. Steer. *Electroplating,* v. 1, Feb. 1948, p. 153-165.

8-43. Metallic Coating of Wire. Herbert Kenmore and Frank L. Durr. *Wire and Wire Products,* v. 23, Feb. 1948, p. 135-138.

Methods previously developed and a new method, the Kenmore process, for electroplating wire of various metals and alloys with different metals by a continuous, automatic process. Plating of Ni-coated, low-carbon steel wire. Other present and potential applications.

8-44. Plating Plastics; Practical Copper Reduction on Nonconductors. H. Narcus. *Metal Industry,* v. 72, Feb. 13, 1948, p. 128-129.

Previously abstracted from *Metal Finishing,* v. 45, Sept. 1947, p. 64-67, 70. See item 8-140, R.M.L., v. 4, 1947.

8-45. Plating Zinc Die-Castings: Pretreatment Prior to Bright Nickel Deposition. (Concluded.) P. Berger. *Met-*

al industry, v. 72, Feb. 13, 1948, p. 129-130.

See abstract of first installment, item 8-32.

8-46. Anodic Coatings on Aluminum and Their Protective Value. D. M. McLachlin and H. P. Godard. *Canadian Chemistry and Process Industries,* v. 32, Feb. 1948, p. 124-128.

A descriptive review. 24 ref. (Presented at Montreal Regional Conference of Protective Coatings Division of the Chemical Institute of Canada, March 1947.)

8-47. A Detailed Description of the New Continuous Electrotinning Plant Now in Operation at the Ebbw Vale Works of Richard Thomas & Baldwins Ltd. D. G. P. Paterson. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 311-320.

Uses "Ferrostan" process developed by Carnegie-Illinois Steel Corp.

8-48. Porous-Chromium Hardening of Diesel Engine Cylinders. C. D. B. Williams. *Engineering,* v. 165, Feb. 6, 1948, p. 139.

Recommended procedure which is based on the work of H. van der Horst, a Dutch engineer. An electrodeposition method is used to produce the chromium layer. Production of the proper type of porosity is very important. Surface preparation and honing of the plated cylinder bore. (Paper presented at meeting of Diesel Engine Users Assoc., London, Jan. 15, 1948.)

8-49. Electroforming Parts With High Strength. *Product Engineering,* v. 19, March 1948, p. 145. Condensed from "The Electroforming Process", William Orbaugh, *Rose Technic,* v. 58, Oct. 1947.

The process and its economics, and the strength and design of electrodeposited parts.

8-50. Rectifiers for Electroplating—Part V. Louis W. Reinken. *Metal Finishing,* v. 46. March 1948, p. 57-61.

Automatic stabilization; voltage and current stabilization; theory of stabilizer design; theory of automatic current stabilization; stabilization of rectifier banks; and economic considerations.

8-51. Production Clinic for Finishing Die Castings. *Die Castings,* v. 6, March 1948, p. 59-60. 62.

Reviews several recent papers on plating range tests and one on barrel plating of Zn-base die castings.

8-52. A New Method for Magnetic Measurement of the Thickness of Composite Copper and Nickel Coatings on Steel. Abner Brenner and Eugenia Kellogg. *Plating,* v. 35, March 1948, p. 242-246.

The method described greatly widens the field for nondestructive testing of plated deposits originated by the senior author through his development of the Magne-gage in 1937. By measuring the attractive force between the specimen and two permanent magnets of different strengths and use of a set of calibration curves, total thickness of the deposit and relative thickness of Cu and Ni layers can be measured with fair accuracy.

8-53. Electroplating From Fluoborate Solutions. Part I. Copper. Karl S. Willson, A. H. DuRose, and D. G. Ellis. *Plating,* v. 35, March 1948, p. 252-254, 304.

Only relatively recently have commercial installations of fluoborate plating baths been seriously considered. Results tend to confirm previously published data, with some modifications, and to extend knowledge concerning this type of bath. Voltages and limiting current densities; lead corrosion by fluoborates; effects of sodium, potassium, iron, and manganese; methods for bath control; and effect of bath type on grain size of deposit.

8-54. Notes on Laboratory Control of Plating Solutions. R. B. Saltonstall. *Plating,* v. 35. March 1948, p. 257.

A brief general discussion.

8-55. Determination of Impurities in Electroplating Solutions. Part VIII. Traces of Sodium and Potassium in Nickel Plating Baths. Earl J. Serfass, W. S. Levine and J. E. Oyler. *Plating,* v. 35, March 1948, p. 260-263, 297.

Details of development of a flame-photometer method for rapid and accurate determination of traces of Na and K in Ni-plating baths when appreciable quantities of Al, Ca, Cu, Cr, Pb, Mn, Fe, SiO_2, Zn, and Ca are present as impurities.

8-56. Process Sheet for Decorative Chromium Plating. George Black. *American Machinist,* v. 92, March 11, 1948, p. 203.

Steps required for applying chromium to a buffed nickel surface.

8-57. Plating Room Health Hazards. *Metal Finishing,* v. 46, March 1948, p. 89.

Data sheet presents outline of hazards for vapor degreasing; alkaline cleaning; pickling, bright dipping, passivating; chromium plating and anodizing; and cyanide solutions.

8-58. Rapid Electropolish and Etch. Albert De Sy and Herman Haemers.

Metal Progress, v. 53, March 1948, p. 368-371.

Belgian originators of process for electropolishing metallographic specimens describe the make-up of the "standard" solution of perchloric acid and denatured alcohol. It is capable of a good etch in 30 sec. Several examples of the results are presented.

8-59. Materials and Requirements for Decorative and Protective Plating. Nelson G. Meagley. *Materials & Methods,* v. 27, March 1948, p. 80-82.

8-60. Zinc Contamination; Methods of Purification of Bright Nickel Plating Solutions. H. D. Carter. *Metal Industry,* v. 72, Feb. 27, 1948, p. 170-173.

Dark deposits that occur in low current density areas on Mazak No. 3 die castings are caused by contamination of the plating solution by zinc. In order to obtain further information on the removal of Zn contamination, a series of investigations was carried out, results of which are described. 11 ref.

8-61. A Theory for the Mechanism of Chromium Plating; A Theory for the Physical Characteristics of Chromium Plate. Cloyd A. Snavely. *Electrochemical Society, Preprint* 92-35, 1947, 39 pages.

Structural characteristics of chromium plating. New fundamental data on crystal structure of chromium deposited from chromic acid solutions.

8-62. Electroplating on Aluminum and Its Alloys. T. A. Hood. *Munitions Supply Laboratories, Department of Munitions, Commonwealth of Australia, Information Circular* 10, Oct. 1947, 41 pages.

An abstracted bibliography of 82 items covering the years 1918-1947 in chronological order.

8-63. Some of the Effects of Cadmium, Zinc, and Tin Plating on Springs. John R. Gustafson. *A.S.T.M., Advance Print* AP5, 1947, 21 pages; discussion, p. 18-21.

Data obtained from fatigue and salt-spray tests.

8-64. The Physical Properties of Electrodeposits; Annual Report on A.E.S. Research Project No. 9. Abner Brenner and Charles W. Jennings. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 25-29; discussion, p. 29-31.

Plans for work on nickel deposits.

8-65. Physical Properties of Electrodeposited Chromium. Abner Brenner, Polly Burkhead, and Charles W. Jennings. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 32-72; discussion, p. 72-73.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 8-31, 1948.

8-66. Stress in Electrodeposits—Its Significance. K. Gustaf Soderberg and A. Kenneth Graham. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 74-96; discussion, p. 111-114.

Reviews published information. Results of experiments on Cu-Ni-Cr plated steel. Four types of cleaning procedure were used on steel panels prior to plating with the three layers. They were then exposed three months to an industrial atmosphere (Pittsburgh). Results were inconclusive since fine edge-cracks were only apparent after intensive cleaning. However there was some difference in appearance. A method for determination and calculation of internal stress and data for nickel deposits. 34 ref.

8-67. Stress in Electrodeposited Nickel. W. M. Phillips and F. L. Clifton. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 97-110; discussion, p. 111-114.

Quantitative method for determination and evaluation of stress, and its effect on serviceability of the electrodeposited metal; reasons for the detrimental effect; and ways to minimize these effects.

8-68. Electroforming Pitot Static Tubes. Alfred S. Kasdan. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 115-120; discussion, p. 120-121.

Mode of operation of copper tubes. Why electroforming was chosen for their manufacture by Killsman Instrument Division of Square D Co., and describes the process briefly.

8-69. Manufacturing Process for Standard 60-In. Reflectors; War Department. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 122-127.

Manufacture by electroforming of 60-in. all-metal reflectors for U. S. Army searchlights from pure copper.

8-70. Protective Power and Porosity of Electrodeposits; Annual Report on A.E.S. Research Project No. 6. N. Thon. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 128-131; discussion, p. 131-134.

Progress, especially with regard to coatings of metals nobler than iron such as nickel, copper, or tin.

8-71. Evaluation of Methods for Determining the Thickness of Electrodeposited Coatings; Annual Report on A.E.S. Research Project No. 7. Harold J. Read. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 135-143; discussion, p. 143-145.

The research program is concentrated on microscopic, magnetic, and chemical methods.

8-72. General Consideration of Experimental Methods in the Study of Polarization at Electrodes in Electroplating Processes; Annual Report on A.E.S. Research Project No. 8. A. L. Ferguson. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 146-155.

8-73. Recent Developments in the Use of Conversion Coatings on Zinc. J. E. Stareck and W. S. Cibulskis. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 171-178; discussion, p. 178-179.

Various electrolytic and dip-type conversion coatings on zinc. Outdoor corrosion resistance correlated with standard salt-spray results covering both white corrosion products and rusting. Resistance is correlated with thickness of plate, effect of impurities, and type of coating applied. Successful commercial uses of clear and colored coatings.

8-74. Barrel Chromium Plating. G. Dubpernell and S. M. Martin. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 180-200; discussion, p. 200.

Previous attempts to chromium plate small parts by tumbling in a barrel. Present successful methods and equipment. A rotating horizontal steel cylinder with an inside anode is used. The plate obtained is bright and can be applied to any desired thickness.

8-75. Bulk Nickel Plating. Henry Strow. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 201-206; discussion, p. 206-207.

Recommended methods and solutions for barrel plating.

8-76. Bright Brass Plating. Stanley J. Beyer. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 208-210; discussion, p. 210-212.

Improved rapid commercial method developed.

8-77. Some Effects of Copper in Nickel Plating Solutions: Annual Report on A.E.S. Research Project No. 5. D. T. Ewing and William D. Gordon. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 213-217; discussion, p. 217.

Bibliographical and experimental work accomplished and future plans. A few results with respect to corrosion resistance of deposits from impure solutions.

8-78. Extraction Methods Applied to the Analysis of Electroplating Baths —Determination of Zinc and Other Impurities in Nickel Plating Solutions; Annual Report on A.E.S. Research Project No. 2. E. J. Serfass and W. S. Levine. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 218-226; discussion, p. 227.

8-79. Modern Applications of Electroplating Solution Purification. B. C. Case. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 228-246; discussion, p. 246-248.

Designs of continuous electrolytic purification systems. Removal rates of Cu, Zn, and Fe from Ni solutions. 28 ref.

8-80. Health Hazards in the Electroplating Industry. Jerome E. Molos. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 270-275.

Results of an extensive survey of electroplating plants in St. Louis in order to evaluate potential health hazards and to submit recommendations for their control.

8-81. Evaluation of the Buffability of Nickel Deposits. R. D. Miller and A. H. DuRose. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 281-295; discussion, p. 295-297.

Development of a reliable test method and apparatus. Experiments were made to compare the buffability of Ni deposits from several types of Ni-plating solutions; to determine the effect of thickness of deposit on buffability; and to determine effect of base-metal polish on buffability of the Ni deposit. Profilometer diagrams of steel surfaces before and after plating.

8-82. Effect of Surface Finishing of Nonferrous Base Metals on the Protective Value of Plated Coatings; Annual Report on A.E.S. Research Project No. 4. George J. Kahan. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 298-300; discussion, p. 300.

Work planned.

8-83. The Effect of Plating Conditions on the Structure of Thick Chromium Electrodeposits. J. J. Dale. *Sheet Metal*

Industries, v. 25, March 1948, p. 531-539, 546.

Investigations of the microstructure of electrodeposited chromium, its relation to plating conditions, and its connection with the channel network produced by surface etching of deposits; a few experiments on the effect of heating on the microstructure of electrodeposits; and some attempts to identify minor constituents in the structure. 16 ref.

8-84. Electrolytic Polishing of Copper; Nature of the Polished Surface. M. Halfawy. *Electroplating,* v. 1, March 1948, p. 205-208.

Results of an electron-diffraction study.

8-85. Electroplating on Nonconductors; Some Practical Experiences. A. H. Stuart. *Electroplating,* v. 1, March 1948, p. 187-191.

Preference, for most applications, for colloidal graphite to provide a conducting film. Available metallic powders; silver-film production; use of graphite; the plating bath; application to porous surfaces; and causes of poor adhesion.

8-86. An Electrolytic Thickness Tester for Plated Metal Coatings. Howard T. Francis. *Journal of the Electrochemical Society,* v. 93, March 1948, p. 79-83.

Device based on anodic dissolution of a defined area of the plated metal, using the current-time product as a measure of the thickness. Successfully measured coatings include: Sn, Zn, Pb, Cd, Cu, Cr, Ag, Au, and brass on steel; and Sn, Zn, Pb, and Cr on brass or Cu. 30 microinches of Sn on steel can be measured with an accuracy of $\pm 2\%$. (To be presented at meeting of the Society, Columbus, Ohio, April 14-17, 1948.)

8-87. The Electrochemistry of Indium. Therald Moeller and B. S. Hopkins. *Journal of the Electrochemical Society,* v. 93, March 1948, p. 84-93.

A review. Includes electrical characteristics and electrodeposition of the metal; and electrochemical properties of indium compounds. 71 ref.

8-88. Process Sheet for Anodizing Aluminum; Chromic Acid Method. *American Machinist,* v. 92, March 25, 1948, p. 133.

Recommended procedures.

8-89. Process Sheet for Decorative Nickel Plating. *American Machinist,* v. 92, March 25, 1948, p. 137.

Recommended procedures.

8-90. Production Electroforming. Thomas S. Blair. *Iron Age,* v. 161, April 1, 1948, p. 72-75.

Installation is electroforming over 40,000 small articles a week. Precision of the pieces and ability of the process to form intricate shapes or articles of high design prove to be the outstanding advantages. Electrodeposition on plastics and electropolishing operations are also touched upon.

8-91. The Anodic Behavior of Metals. Part III.—Nickel. A. Hickling and J. E. Spice. *Transactions of the Faraday Society,* v. 43, Nov.-Dec. 1947, p. 762-769.

The initial buildup of anodic polarization at a nickel anode over a wide range of conditions was investigated, using the cathode-ray oscillograph. In alkaline solutions (pH 12 to 14), two main stages were distinguished corresponding to the charging of a double layer and the deposition of oxygen at the electrode. It is believed that the latter process corresponds to formation of a layer of nickelic oxide. In buffer solutions (pH 5 to 10), a nickel anode may become passive by the primary formation of a sparingly soluble salt film; this may be followed by oxide formation if the film is porous. In more acid solutions, behavior depends upon the presence or absence of a protective film. 20 ref.

8-92. Deposition of Metals From Their Chloride Solutions. (In Russian.) D. M. Chizhikov and B. Ya. Tratsevitskaya. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1653-1661.

Results of a study for Zn, Fe, Sn, Pb, and Cu, including effects of various factors.

8-93. Kinetics of Deposition of Cobalt and Nickel From Aqueous Solutions by Metallic Zinc. (In Russian.) G. S. Frents and B. P. Kreingauz. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1705-1712.

Experimental results show that deposition takes place most efficiently at a pH of 3.5 to 4.0. The process of deposition proceeds more rapidly at higher concentrations of metal in solution. Co is deposited twice as fast as Ni for the same conditions.

8-94. Electroforming and Deposition Brings New Latitude to the Designer. *Inco,* v. 22, Spring 1948, p. 12-13.

Complicated shapes impossible to produce economically by other fabricating methods as well as deposi-

tion of metal on a plastic base are made possible on a production basis.

8-95. Hard Nickel Electroformed Molds; Position Reviewed After Four Years. P. Spiro. *Plastics,* (London), v. 12, March 1948, p. 132-136.

Refers to article in May 1944 issue: "A New Process for Making Molds by Electrodeposition", and outlines results of four more years of development work.

8-96. Industrial Electrodeposition; Quality of Adhesion—Testing of Deposits. R. E. Wilson. *Metal Industry,* v. 72, March 12, 1948, p. 211-213; March 26, 1948, p. 251-254.

Methods of obtaining complete bonding and adequate protection against corrosion with emphasis on deposition of Ni and Cr on steel. Applications to salvage of heavy parts and equipment.

8-97. Streamlined Analytical Control of Gold-Alloy Plating Solutions. Karl Nell. *Plating,* v. 35, April 1948, p. 345-350.

Stepwise colorimetric procedure developed as a result of experimentation for Au, Ni, Cu, and phosphate ion, which may be applied to a single sample (5 to 10cc.) of plating solution.

8-98. A Silver Recovery Plant Before and After. *Plating,* v. 35, April 1948, p. 354-357.

Revolutionary changes in plant of silverware manufacturers by which a dilapidated, crowded, ill-ventilated and dirty shop was transformed into a spacious, spic-and-span,pleasant place to work.

8-99. Ultra-Modern Plating Setups Employed at G. E. Plant. Herbert Chase. *Products Finishing,* v. 12, April 1948, p. 24-26, 28, 30, 32.

New plant manufacturing "all-automatic" washer which utilizes latest equipment and processes for cleaning and applying bright-zinc and hard-chromium coatings to steel parts.

8-100. Plating on Aluminum. *Electroplating,* v. 1, April 1948, p. 271-273.

Process just patented in England by a Swiss concern. Copper is first deposited on a cleaned and partially deoxidized aluminum surface. Hydrogen liberated during the coppering operation is believed to reduce all remaining oxide so that the metal surface, stripped of copper by an acid mixture, is then suitable for plating. Nickel is then deposited, followed by zinc or cadmium and other metals if required. It is essential that the metal deposited over the original nickel plate should have a crystal structure different from that of the nickel, in order to reduce porosity.

8-101. Transmission of Cracks From Plate to Underlying Metal. F. D. Rowe and J. B. Dance. *Metal Progress,* v. 53, April 1948, p. 537-538.

An example of fatigue failure of an exhaust-valve stem overlaid with chromium. Pre-existing stress cracks in the plating are linked with fatigue cracks in the base metal. The authors conclude that hard chromium is an unsatisfactory coating for components operating under fluctuating stresses.

8-102. Corronizing Processes. *Wire and Wire Products,* v. 23, April 1948, p. 311, 343-348.

Use of nickel-zinc and nickel-tin in the protection of steel articles against corrosion.

8-103. The Production of Electroformed Molds. P. Spiro. *British Plastics,* v. 20, March 1948, p. 124-129; **The Production of Electroformed Molds for Plastics and Die Castings** (same author) *Electroplating,* v. 1, April 1948, p. 256-262; discussion, p. 262-266.

The process; type of mold, the master material, metalizing of the master, and selection of the metal for deposition. Choice was among Ni, Fe, Co, and Cr. All but the first were ruled out on various grounds. Composition of the bath; adhesion, pitting, and stress problems; alternative baths; throwing power; hardness and ductility of the deposit; corner weakness; backing and polishing the shells; and analysis for traces of cobalt. 11 ref. (Presented at meeting of Electrodepositors' Technical Society, London, Feb. 16, 1948.)

8-104. Electropolishing—A Survey. (Conclusion.) Samuel Wein. *Metal Finishing,* v. 46, April 1948, p. 76-82.

Applications and limitations of the process from the practical standpoint, and the different baths used.

8-105. Economical Rinse Tank Design. J. B. Mohler. *Iron Age,* v. 161, April 15, 1948, p. 76-77, 140.

Tanks used in electroplating and in other processes where rinsing operations are carried out. Principles of design for both single and multiple-tank systems and methods for checking and controlling rinsing efficiency. Sample calculations for determination of tank design and most economical water flow.

8-106. Vinyl Plastics for Masking in Electroplating. *Iron Age,* v. 161, April 15, 1948, p. 94.

Resulted in specific operation improvements.

8-107. Electrodeposition of Tungsten Alloys. *Corrosion and Material Protection,* v. 5, March-April 1948, p. 10, 17.

Results of an investigation by the National Bureau of Standards.

8-108. The Brightening Action of Organic Sulphonates in Bright Nickel Plating. G. E. Gardam. *Sheet Metal Industries,* v. 25, April 1948, p. 743-746, 755.

The mechanism of absorption of the sulphonate and of its brightening action. Inclusion of the addition agent was confirmed by the presence of appreciable amounts of carbon and sulphur in the deposit and the presence of waxy material after dissolution of the deposits in nitric acid. Three possible mechanisms, evidence in support of adsorption on metallic Ni. The brightening action is ascribed to the smoothing action brought about by inclusion of a greater amount of sulphonate on raised areas. Periodic variations of current density cause the parallel lines typical of bright-Ni deposits.

8-109. Electroformed Precision Prisms. Benjamin Goldberg. *Journal of the Optical Society of America,* v. 38, April 1948, p. 409-412.

Details of an investigation to determine the feasibility of producing electroformed retro-directive copper reflectors with an accuracy approaching that of the precision-ground trihedral glass prism used as the mold. It was found that the metal prism, although about as accurate as the glass prism at a distance of one mile, was still not as accurate as its mold. However, continued improvement in optical accuracy of the successively manufactured prisms indicates that ultimate accuracy possible by electroforming had not yet been determined. Reflectors produced by electro-forming would cost about one sixth as much as commercially produced glass prisms of the same optical accuracy.

8-110. Mechanism of Electrodeposition of Nickel. Part III. Influence of Selenium Dioxide Addition on the Structure and Internal Stress of Nickel Deposits (In Russian.) G. S. Vozdvizhenskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Nov. 1947, p. 1171-1175.

It was found that SeO_2 additions to the electroplating bath, even in very small amounts, affect to a certain extent the structure and appearance of nickel deposits. It is believed that SeO_2 serves as catalyst for saturation of the deposit with hydrogen.

8-111. The "New Look"; The Impact of Nuclear Physics on Electrodeposition Theories. *Metal Industry,* v. 72, April 9, 1948, p. 286-288; April 23, 1948, p. 326-329.

Written in order to stimulate the interests of chemists and engineers in the study of the physical side of the science of electrodeposition, this controversial article gives a picture of the processes involved in electrodeposition when approached from the angle of the physicist.

8-112. Zinc Film Permits Plating on Magnesium. H. K. DeLong, *American Machinist,* v. 92, May 6, 1948, p. 98-100.

Development of satisfactory process. Details of procedure for cleaning, pickling, and applying the film. The new process has been used to apply Cr, Ni, Cu, brass, Cu, Zn, Au, and Ag.

8-113. Process Sheet for Indium Plating. George Black. *American Machinist,* v. 92, May 6, 1948, p. 139.

8-114. Plating Techniques for Rebuilding Aircraft Engine Parts. Joseph Albin. *Iron Age,* v. 161, May 6, 1948, p. 82-85.

An installation where laboratory developed procedures and jigs have established standardized, production-type operations and have resulted in substantial savings. Jig designs and process specifications for several types of electrodeposition including the double plating of tin and silver, lead-indium work, silver plating for soft bearing surfaces, press-fit coatings, and plating to build up worn surfaces to dimension.

8-115. Anodes. E. R. Thews. *Metal Finishing,* v. 46, March 1948, p. 68-75; April 1948, p. 61-66; May 1948, p. 74-79.

Previously abstracted from *Metal Industry.* See items 8-134, 8-150, 8-157, 8-173, R.M.L., v. 4, 1947.

8-116. Electrodeposition of Metallic Coatings on Magnesium Alloys. R. R. Rogers and M. L. Boyd. *Sheet Metal Industries,* v. 25, April 1948, p. 959-962.

Result of experimental work dealing with deposition of Zn; deposition of composite metal coating (Ni-Sn-Ni and Zn-Cu-Ni); deposition on Mg alloys containing small percentages of Ag or Pb; and preferred conditions for deposition from fluoborate baths. It was found that Zn can be plated on typical Mg alloys from a fluoborate bath; that Zn-Cu-Ni coatings are less porous than Ni alone; that 1% Ag or Pb in the 1.5%-Mn Mg alloy makes

it easier to plate with Zn or Ni; and that certain conditions are common to Zn and Ni plating of Mg alloys. (Presented at 3rd International Conference on Electrodeposition of Electrodepositors' Technical Society.)

8-117. **Batch Electropolishing of Small Parts.** Ray Vicker. *Steel Processing,* v. 34, May 1948, p. 259-260.

Method developed for small steel parts and results obtained. (Based on paper by J. F. Kreml, presented at Chicago Technical Conference, March 1948.)

8-118. **Modern Electroplating Laboratory for Development and Pilot-Plant Studies.** George Jernstedt. *Metal Finishing,* v. 46, May 1948, p. 52-56.

Laboratory and facilities.

8-119. **Fabricating and Finishing Stainless Steel. Part IV.** Arthur P. Schulze. *Metal Finishing,* v. 46, May 1948, p. 64-68, 79.

Electropolishing. Ten chief reasons for using this process and all necessary information, including formulas and detailed operating instructions.

8-120. **Electroplating Research; Past and Present.** George Dubpernell. *Plating,* v. 35, May 1948, p. 446-448.

A brief historical survey.

8-121. **Stress Data on Copper Deposits From Alkaline Baths.** A. Kenneth Graham and Robert Lloyd. *Plating,* v. 35, May 1948, p. 449-450, 506.

Experimental results. The procedure was the usual one, the Soderberg-Graham general stress equation being used in the calculations. Effects of variations in operating conditions and bath compositions, including effects of impurities or addition agents.

8-122. **Mechanical Properties of Nickel Deposits.** E. J. Roehl. *Plating,* v. 35, May 1948, p. 452-455, 478.

Effects of pH on various mechanical properties are given for as-plated and annealed deposits from Watts baths of several compositions. 13 ref.

8-123. **Control of Electroplating Solutions by Analysis and Observation. Part I.—Introduction.** K. E. Langford. *Electroplating,* v. 1, May 1948, p. 318-320.

Various aspects of the problem. (To be continued.)

8-124. **Mechanism of Electrodeposition of Nickel. Part IV. Electrodeposition of Nickel During Direct Action of Atomic Hydrogen.** (In Russian.) G. S. Vozdvizhenskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Dec. 1947, p. 1255-1260.

A method for experimental study of action during electrodeposition of metals is proposed. During electrodeposition of nickel, hydrogen participates directly in the formation of the structure of the electrodeposit.

8-125. **The Use of Plastic Beads on Chrome Plating Tanks.** Arthur C. Stern, Lawrence P. Benjamin, and Harry Goldberg. *Journal of the Electrochemical Society,* v. 93, May 1948, p. 67N-68N. A condensation.

The beads float on the surface of the plating bath and cause the bubbles of gas to escape at the surface of the liquid without bursting violently. They also provide a large wetted surface for entrapment of mist droplets.

8-126. **Practical Method Developed for Plating on Magnesium.** H. K. DeLong. *Materials & Methods,* v. 27, May 1948, p. 63-65.

The only difference from established plating procedures is the addition of a simple preliminary-immersion, zinc-coating step which is applied immediately after standard cleaning operations. It is a patented development.

8-127. **Sur un Procédé d'Etude du Polissage Electrolytique.** (Method for Study of Electrolytic Polishing.) I. Epelboim and C. Chalin. *Métaux & Corrosion,* v. 23, Jan. 1948, p. 1-4.

On the basis of a thorough investigation of P. Jacquet's method of electropolishing, it was found possible to determine optimum conditions from a plot of the variation in resistance of the electrolytic cell. 11 ref.

8-128. **Emploi d'une Anode Tournante dans le Polissage Electrolytique du Cadmium et de l'Aluminium.** (Use of a Rotating Anode in the Electropolishing of Cadmium and Aluminum.) Jacques Farran. *Metaux & Corrosion,* v. 23, Jan. 1948, p. 9-11.

Development of a satisfactory technique.

8-129. **Electrozinc Phosphate Coatings for Iron and Steel.** E. E. Halls. *Metallurgia,* v. 38, May 1948, p. 34-36.

Test results indicate that the combined process, in some cases, gives a better finish than is provided by phosphatization alone; and in others a better finish than that by phosphatizing over electroplated zinc coatings.

8-130. **Electropointed Tungsten Wires.**

W. G. Pfann. *Bell Laboratories Record,* v. 26, May 1948, p. 205-208.

Solution of the problem of forming a point on a wire smaller in diameter than a human hair which arose in connection with the recent appearance of silicon and germanium point-contact rectifiers as circuit elements in microwave radar.

8-131. Tin Plating of Electro Shells; Application of Fluoborate Solutions. *Electrotypers & Stereotypers Journal,* v. 12, May 1948, p. 242, 244. Condensed from address by Clifford Struyk.

Detailed directions including bath compositions and preparation, and operating conditions.

8-132. The Hydrogen Ion. J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 46, June 1948, p. 85-89, 152.

Fundamental principles of acids and bases, ionization of water, and buffer action; and their application to measurement and control of pH of electroplating baths. Colorimetric, electrometric, and titration methods for pH measurement.

8-133. Plating and Airline Efficiency. Joseph Albin. *Metal Finishing,* v. 46, June 1948, p. 90-94, 109.

A good example of how special plating requirements are performed in an efficient manner on aircraft-engine parts.

8-134. Electrolytic Pickling. Konrad Weller. *Metal Finishing,* v. 46, June 1948, p. 95-102.

The various methods developed for electrolytic pickling for scale removal and surface cleaning. 17 ref.

8-135. Experiences With the Rochelle Copper Plating Solution. N. A. Tope. *Sheet Metal Industries,* v. 25, June 1948, p. 1191-1194.

Work done on copper plating of large quantities of miscellaneous airplane-engine components. The coating is used for stopping-off during carburizing, the copper being machined from surfaces to be hardened.

8-136. Some Metallurgical Aspects of Electrodeposits. Carl E. Heussner, A. R. Balden, and L. M. Morse. *Plating,* v. 35, June 1948, p. 554-561, 577-578.

Porosity hardness, tensile strength, and brittleness. Data on mechanical properties of various deposits, hardness of electrodeposited metals and effect of addition agents on various properties. 10 ref. (To be continued.)

8-137. Stripping of Copper. Part V. Deplating in Cyanide Solutions. F. C. Mathers and E. L. Martin. *Plating,* v. 35, June 1948, p. 569-570, 575-576.

This part of the A.E.S. Research Project No. 1 concerns deplating of Cu from ferrous-base metals in cyanide solutions. A solution which is in commercial use and which is considered representative of the baths normally employed is used. Effects observed. 15 ref.

8-138. Thickness Standards for Cadmium Electroplate. George Black. *Product Engineering,* v. 19, June 1948, p. 165.

8-139. Thickness Standards for Zinc Electroplate. George Black. *Product Engineering,* v. 19, June 1948, p. 167.

8-140. Process Sheet for Anodizing Aluminum; Alumilite Sulphuric-Acid Method. George Black. *American Machinist,* v. 92, June 17, 1948, p. 141.

8-141. Erfahrungen mit elektrolytisch hergestellten Laufschichten in Gleitlagern unter besonderer Berucksichtigung des Auslandes. (Experiences With Electrolytically Prepared Working Surfaces for Slide Bearings With Special Attention to Foreign Work.) Franz Bollenrath. *Metalloberfläche,* v. 1, Jan. 1947, p. 3-10.

36 ref.

8-142. Uber die Lebensdauer kieselfluorwasserstoffsäurehaltiger Chrombäder. (Life of Fluosilicic-Acid-Containing Chromium-Plating Baths.) Karl Gebauer and Karl Sommer. *Metalloberfläche,* v. 1, Feb. 1947, p. 25-27.

Chromium plating baths containing fluosilicic acid are economical and have long life. The effect of variation in bath compositions during the useful life.

8-143. Die elektrolytische Abscheidung glanzender Metallniederschläge. I. Allgemeines und wissenschaftliche Grundlagen. II. Die Praxis der Glanzbader. (The Electrolytic Deposition of Bright Metal Deposits. Part I. General and Scientific Principles. Part II. Bright Metal Baths in Practice.) Johannes Fischer. *Metalloberfläche,* v. 1, Feb. 1947, p. 28-31; March 1947, p. 49-56.

A comprehensive literature review includtng considerable German work. Many bath compositions.

8-144. Elektrophosphatierung. (Electrolytic Phosphating.) Richard Springer. *Metalloberfläche,* v. 1, April 1947, p. 78-80.

Cathodic phosphating and phosphating with alternating current.

8-145. Elektrolytisches Polieren. (Electrolytic Polishing.) Johannes Fischer. *Metalloberfläche,* v. 1, April 1947, p. 81-83.

Published bath compositions for the different metals.

8-146. Oberflächenschutz von Stahl durch Kupferplattierung. (Surface

Protection of Steel by Copper Plating.) H. Bröking. *Metalloberfläche,* v. 1, May 1947, p. 101-104.

Various methods for coating steel with copper and its alloys. Strength at several temperatures and heat conductivity.

8-147. Rauhe und streifige Niederschläge bei der Kupfergalvanoplastik. (Rough and Striated Deposits in Copper Plating.) Richard Erdmann. *Metalloberfläche,* v. 1, May 1947, p. 114.

Recommended procedures for avoidance of rough and striated deposits.

8-148. Procédé d'étude du polissage électrolytique. (Method for Study of Electropolishing.) Israel Epelboim and Claude Chalin. *Comptes Rendus* (France), v. 226, Jan. 26, 1948, p. 324-326.

Previously abstracted from *Metaux & Corrosion,* v. 23, Jan. 1948, p. 1-4. See item 8-127, 1948.

8-149. Electroplated Coatings. George Black. *Materials & Methods,* v. 27, June 1948, p. 93-104.

Properties of coatings; types and characteristics of electrolytes; electroplating theory; preparation and equipment for electroplating; and testing of coatings.

8-150. Electrolytic Descaling. Carl A. Zapffe. *Metal Progress,* v. 53, June 1948, p. 833-836.

Further evidence for the theory that scale is blasted away from metal by bubbles of hydrogen issuing from within the metal and under high pressure.

8-151. Nature of Hexagonal Chromium and Structure of Electrolytic Chromium Deposits. (In Russian.) S. A. Nemnonov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 239-246.

Critical study of the literature indicates that hexagonal Cr, should be considered as a metastable phase. During electrodeposition, with a high degree of dispersion of the newly formed crystal, hexagonal Cr has the lowest amount of free energy. 26 ref.

8-152. The Value of Specifications for Nickel Electroplate. *Nickel Bulletin,* v. 21, April 1948, p. 46-48.

With reference to British Standard 1224:1945, which states that articles to be finished with chromium must first be plated with nickel.

8-153. Pore Volume of Electrolytically Produced Protective Coatings on Aluminum. K. Huber. *Journal of Colloid Science,* v. 3, June 1948, p. 197-206.

Protective oxide coatings produced electrolytically on aluminum have a structure closely similar to that of an ideal "columnar mixture" of Wiener. Attempt is made to compute the pore volume, basing the computation on Wiener's theory.

8-154. Electroplating Non-Metallic Articles. William Edwards. *Western Metals,* v. 6, June, 1948, p. 36-38.

Techniques used by six firms in the Los Angeles area. Conditions for which the process is especially suitable.

8-155. Plating Magnesium; Practical Process Involving Zinc Immersion Coating. H. K. DeLong. *Metal Industry,* v. 72, June 18, 1948, p. 502-503. Condensed from recent issue of *Materials & Methods.*

Previously abstracted from *American Machinist,* v. 92, May 6, 1948, p. 98-100. See item 8-112, 1948.

8-156. Process Sheet for Zinc Electroplating. George Black. *American Machinist,* v. 92, July 1, 1948, p. 127.

8-157. New Methods of Electro-Forming and Depositing Nickel Make Possible Economic Production of Complicated Shapes and Application of Metal on Plastic Bases. *Steel,* v. 123, July 12, 1948, p. 106, 109.

Two developments being used in a number of different fields.

8-158. Electrolytic Tinning Process Speeded by Power Brush Application. *Steel,* v. 123, July 12, 1948, p. 122.

8-159. Electroplating Magnesium and Its Alloys. H. K. DeLong. *Metal Finishing,* v. 46, July 1948, p. 46-49, 100.

Previously abstracted from *American Machinist,* v. 92, May 6, 1948, p. 98-100. See item 8-112, 1948.

8-160. Throwing Power of Electroplating Solutions. A. Mankowich. *Metal Finishing,* v. 46, July 1948, p. 50-54.

The various definitions of throwing power that have been proposed. Advantages and limitations of the Haring and Blum concept and of throwing-power determination by the Haring cell, 25 ref.

8-161. Fluid Mechanics: Forgotten Factor in Electroplating. Part III. Joseph B. Kushner. *Metal Finishing,* v. 46, July 1948, p. 55-59, 72.

How viscosity affects dragout, concentrations, and electropolishing. (To be concluded.)

8-162. The Mechanism of Exfoliation of Electrodeposited Surfaces. A. T. Steer. *Metal Finishing,* v. 46, July 1948, p. 62-70. Reprinted from *Sheet Metal Industries.*

8-163. Hard Plating on Aluminum; Electrodeposition of Chromium on to

Light Alloy Castings. *Automobile Engineer,* v. 38, June 1948, p. 236.

Process developed by British firm and technique for preventing the breaking away of the deposit at the port edges.

8-164. Full Automatic Cadmium Plating at Friden. J. DeLamar Harrell. *Products Finishing,* v. 12, July 1948, p. 20-22, 24.

A loading conveyer combined with use of a full automatic plating machine enables Friden Calculating Machine Co. to cadmium-plate 8000 small parts per hr.

8-165. Diesel Engine Wear Speeded by Surface Disintegration; Slowed by Porous Chrome Plating. *SAE Journal,* v. 56, July 1948, p. 40-43. Discussion, p. 43. Based on **U. S. Naval Engineering Experiment Station Investigations on Cylinder Liner Wear,** by Warren G. Payne and William F. Joachim. (To be published in full in *SAE Quarterly Transactions.)*

Surface disintegration is an important factor in diesel-engine wear; and porous chromium plating protects the surface from it and also from other wear-inducing factors. Metal is lost from the cylinder wall in the form of fine particles by two mechanisms. Data on wear reduction by chromium plating.

8-166. Recent Developments in Tin and Tin Alloy Coatings. John Ireland. *Journal of the India Society of Engineers,* v. 13, Jan. 1948, p. 8-13.

Reviews especially the work of the Tin Research Institute in England with emphasis on electrodeposited coatings.

8-167. Neuere Untersuchungen uber den Korrosionsschutz von Duralumin durch Plattieren. (Recent Work on the Prevention of Corrosion of Duralumin by Plating). H. J. Seemann. *Metall,* Sept. 1947, p. 8-15.

The corrosion resistance of duralumin plated with an Al-Mg-Si alloy; the effect of the plating on the strength and hardness of the core; the effect of copper diffusion in the cold and hot rolled metal; the effect of plating with pure aluminum.

8-168. Aluminiumplattierte Stahlbänder. (Aluminum-Plated Sheet Steel.) *Metall,* Nov. 1947, p. 83-84.

Three methods for depositing aluminum on steel: first, a special device to permit application of any thickness in one operation; second, use of special steel which can be annealed below the temperature of formation of brittle $FeAl_3$; and third, use of Si and Mn to prevent formulation of $FeAl_3$. High corrosion resistance is obtained by plating pure Al on top of the primary deposit of Al alloy.

8-169. The Anodizing and Dyeing of Aluminum and Its Alloys. C. C. Hanson. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 100-127.

Properties of Al and Al alloys with regard to corrosion resistance and suitability for anodic oxidation, and the anodizing process itself, including fundamentals and operating procedures. Various bath compositions and procedures. Suggested plant layout, and flow sheet. 13 ref.

8-170. Control of Electroplating Solutions by Analysis and Observation. II. Available Methods, Applications and Accuracy of Results Obtained. K. E. Langford. *Electroplating and Metal Finishing,* v. 1, July 1948, p. 426-428, 458.

Gravimetric and volumetric methods.

8-171. Continuously Electroplated Steel Strip and Sheet. A. Smart and F. H. Smith. *Electroplating and Metal Finishing,* v. 1, July 1948, p. 435-439; discussion, p. 439-441.

Reasons for pre-plating steel strip and methods of manufacturing this material.

8-172. Better Deposits at Greater Speeds by PR Plating. George W. Jernstedt. *Plating,* v. 35, July 1948, p. 708-713.

Refers to periodic-reverse electroplating (reversing the current briefly at short periodic intervals to remove unsound deposits). Advantages and required equipment.

8-173. Some Metallurgical Aspects of Electrodeposits. (Continued.) Carl E. Heussner, A. R. Balden, and L. M. Morse. *Plating,* v. 35, July 1948, p. 719-723, 768.

Internal stress and adhesion and their measurement; also effects of physical properties and conditions on appearance, corrosion resistance, and fatigue life. Technique for measuring and calculating internal stresses.

8-174. Adhesion of Electrodeposits. VI. Determination of Adhesion Through the Use of Cement. A. L. Ferguson, and M. V. Tsao. *Plating,* v. 35, July 1948, p. 724-729.

It was thought that the most satisfactory method for determining adhesion would be one that would make use of a direct pull perpendicularly to the surface. Bond-shear strengths were obtained for a large number of recently developed high-strength cements and bonding tech-

niques, although no work was done on actual electrodeposits. Bond strengths of only 4000 to 6000 psi. were obtained, and these not consistently, using Bakelite XJ 16320 cement; other cements gave even lower values.

8-175. **Lead Plating; Method of Deposition on Bronze Bearing Surfaces.** H. Silman and M. F. E. Fry. *Metal Industry,* v. 73, July 16, 1948, p. 48-50. A condensation.

Procedure and use of lead plating to increase the life of aluminum-bronze rotors for fuel pumps for gas-turbine engines.

8-176. **Plating Zinc Diecastings at Gerity-Michigan.** William MacLeay. *Iron Age,* v. 162, July 29, 1948, p. 90-94.

Procedures used on two electroplating lines handling the bulk of the Zn-base die castings. One of these is an automatic line for small and medium-sized work and the other is a deep-tank line for large pieces such as automobile grilles.

8-177. **Purification of a Small Watts Type Nickel Plating Bath.** N. L. Carter. *Plating,* v. 35, Aug. 1948, p. 815-817, 864.

Includes introduction by J. J. Dale. Experiences in purification of a 300-gal. bath which had been in use for five years without any purification except filtration. Treatments recommended for removal of different types of impurity and for prevention of different undesirable surface effects, as well as pH and current densities for removal of metallic impurities. 11 ref.

8-178. **Electroplating of Roller Chain.** G. G. Mize. *Plating,* v. 35, Aug. 1948, p. 818.

Association of Roller and Silent Chain Manufacturers has concluded that plating of assembled precision steel-roller transmission chains is extremely hazardous.

8-179. **Screening at V. H. F.** B. Roston. *Wireless Engineer,* v. 25, July 1948, p. 221-230.

Very high frequency properties of various metallic surfaces which are economic and which may be readily adapted to production. An analysis of the problem of shielding shows that in the case of a receiver, where only the radiation field requires to be screened, a conducting sheet makes an efficient shield. An experimental method has been developed by which the efficacy of various forms of metallic shield may be assessed. Tests upon electrodeposited steel specimens and sprayed-metal specimens have given results which confirm the theoretical deductions and determine the order of their screening efficacy.

8-180. **The Ferrostan Electrolytic Tinning Line at Richard Thomas and Baldwins, Ltd., Ebbw. Vale.** *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 297-314.

Description and operation of plant; civil engineering aspects; mechanical engineering features; and electrical engineering features.

8-181. **The Physical Properties of Electrodeposits—Their Determination and Significance.** Seymour Senderoff. *Metal Finishing,* v. 46, Aug. 1948, p. 48-57.

The significance of each of the properties to the general requirements of electroplates, and to particular requirements in specific applications, together with the most reliable methods for measuring these properties. 15 ref.

8-182. **Oberflächenschutz von Stahl durch Kupferplattierung.** (Copper Plating as a Surface Protection of Steel.) (Conclusion.) Hans Bröking. *Metalloberfläche,* v. 1, June 1947, p. 137-139.

Precautions to be taken in production of articles of copper-plated sheet steel. Methods of preparing the sheets for welding and flanges.

8-183. **Elektrolytisch gewonnene Wolfram-Kobalt-, Wolfram-Nickel- und Wolfram-Eisen-Legierungen.** (Electrolytic Tungsten-Cobalt, Tungsten-Nickel, and Tungsten-Iron Alloys.) H. Offermanns and M. V. Stackelberg. *Metalloberfläche,* v. 1, June 1947, p. 142-144.

Methods of obtaining tungsten alloys by electrolysis and a process of making alloys of iron, cobalt, and nickel with a maximum of 50% W. The effect of the pH value, temperature and current density, the hardness and corrosive resistance of electrolytic W-Co alloy, as well as the crystal structures of these tungsten alloys.

8-184. **Entfernen von Nitraten aus galvanischen Bädern, bevorzugt aus Nickelbädern.** (Removing Nitrates From Electrolytic Baths, Especially From Nickel Baths.) Rudolf Wommelsdorf. *Metalloberfläche,* v. 1, July 1947, p. 164-165.

A simple method for the above.

8-185. **Abblättern und Abschälen von Vernicklungen I.** (Peeling and Scaling of Nickel-Plating. Part I.) T. Richards. *Metalloberfläche,* v. 1, July 1947, p. 173-176.

Analyzes systematically the different causes of peeling and scaling of nickel-plated metals and indi-

cates methods of preventing this effect. (To be concluded.)

8-186. Plating Bath Troubles. H. J. Sedusky and J. B. Mohler. *Metal Industry*, v. 73, July 30, 1948, p. 91-93.

Off-color deposits, blistered deposits, poor adhesion, rough deposits, low cathode frequency, high metal content, and poor anode corrosion are but some of the common troubles which from time to time confront every electrodepositor. Methods of dealing with these troubles. (To be concluded.)

8-187. Electroplated Finishes on Aluminum. Rick Mansell. *Light Metal Age*, v. 6, Aug. 1948, p. 24, 27.

A general summary of standard electroplating methods for different finishes.

8-188. Uber die elektrolytische Herstellung von Bleibronzelagern. (Electroforming of Lead-Bronze Bearings.) A. Beerwald and L. Dohler. *Archiv fur Metallkunde*, v. 1, Sept. 1947, p. 412-417.

Experimental process and equipment, using alkaline tartrate and citrate baths. Critically evaluates the prospects of the process.

8-189. Anodicka oxydace hliniku a jeho slitin. (Anodic Oxidation of Aluminum and Its Alloys.) Jan Kaloc. *Hutnické Listy*, v. 3, April-May 1948, p. 135-143.

Most important methods for the above and the properties of the resulting layers. Results of comparative tests using different alloys in contact with chromic, sulphuric, and oxalic acids, also various additions and conditions.

8-190. Touring a Silver Plating Plant. A. A. Parsons. *Electroplating*, v. 1, Aug. 1948, p. 488-494, 530.

Author takes reader on an imaginative tour of a medium-sized silver-plating shop commenting on the plant, solutions and processes employed in the light of his experience.

8-191. Notes on Modern Nickel and Chromium Plating Practice. N. Christie. *Electroplating*, v. 1, Aug. 1948, p. 495-501; discussion, p. 501-503.

Certain rules for bright and heavy nickel and chromium-plating techniques. Suggestions for reducing costs.

8-192. Pyrophosphate Copper Plating. *Electroplating*, v. 1, Aug. 1948, p. 523-526, 534.

Development of pyrophosphate solutions for the electrodeposition of copper as described by American and Russian workers. The latest development points to the value of nitrate additions in effecting an all-round improvement.

8-193. Continuous Gas-Radiant Fusion for Electrolytic Tinning. C. E. Cunningham. *Iron and Steel Engineer*, v. 25, Aug. 1948, p. 85-92.

The inverse-square law for radiation effect offers a rapid and accurate method of controlling the amount of heat to be transmitted particularly in a continuous processing line.

8-194. Plating Bath Troubles. (Concluded.) H. J. Sedusky and J. B. Mohler. *Metal Industry*, v. 73, Aug. 13, 1948, p. 126-128.

Remedies for common electrodeposition faults.

8-195. Periodic Reverse Plating; Better Deposits at Greater Speeds. G. W. Jernstedt. *Metal Industry*, v. 73, Aug. 27, 1948, p. 171-173. (A condensation.)

Previously abstracted from *Plating*, v. 35, July 1948, p. 708-713. See item 8-172, 1948.

8-196. Advantages of Chromium Plating. *Steel*, v. 123, Aug. 30, 1948, p. 56-57.

A review of characteristics. Process reduces adhesion and wear, thereby more than justifying its cost in many applications.

8-197. Fluid Mechanics: Forgotten Factor in Electroplating. Part IV. Joseph B. Kushner. *Metal Finishing*, v. 46, Sept. 1948, p. 52-58.

The cathode film and the relative effects of various methods of solution agitation on the limiting current densities that can be used for electroplating.

8-198. Design of Plating Range Cells. J. B. Mohler. *Metal Finishing*, v. 46, Sept. 1948, p. 59-61.

The factors that affect design of plating cells for solution control and how special cells provide more accurate information than standard cells in some cases.

8-199. Determination of p-Toluenesulfonamide in Nickel Plating Baths. Julius Sirota. *Metal Finishing*, v. 46, Sept. 1948, p. 68-69.

The method makes use of the chlorination of p-toluenesulphonamide to p-toluenesulphonedichloramide. The amide is then solvent extracted, dissolved in acetic acid and excess KI solution, and titrated with sodium thiosulphate, using starch as an indicator.

8-200. Surface Areas of Standard Machine Screws. *Metal Finishing*, v. 46, Sept. 1948, p. 77.

A table for use in barrel plating computations on commercial machine screws.

8-201. Process Sheet for Copper Plat-

ing. George Black. *American Machinist,* v. 92, Sept. 9, 1948, p. 139.

8-202. Notes on Filtration in a Modern Plating Plant. G. M. Cole. *Plating,* v. 35, Sept. 1948, p. 904-909.

A schematic drawing of a modern filtration system and some of the features of filtration in practice today.

8-203. Porosity of Electrodeposited Metals. III. Measurement of Intrinsic Porosity. (Concluded). *Plating,* v. 35, Sept. 1948, p. 917-920, 967.

The measurement of one particular kind of porosity only, which the authors call intrinsic or systematic porosity. This kind of porosity is present in perfect deposits free from gross pores caused by base metal imperfections, dirt in the plating solution, and the like.

8-204. Plating Bath Troubles. H. J. Sedusky and J. B. Mohler. *Canadian Metals & Metallurgical Industries,* v. 11, Aug. 1948, p. 23-24, 38.

Previously abstracted from *Metal Industry,* v. 73, July 30, 1948, p. 91-93; Aug. 13, 1948, p. 126-128. See items 8-186 and 8-194, 1948.

8-205. Contributo allo studio della elettrodeposizione di leghe—Nota IV. (Contribution to the Study of the Electrodeposition of Alloys. Part IV.) Roberto Piontelli. *La Metallurgia Italiana,* v. 40, Jan.-Feb. 1948, p. 3-8.

After a general review of the theory of electrodeposition of alloys as compared to the electrodeposition of pure metals, methods for electrodeposition of alloys using fused-salt baths are described. Composition and structure of deposits.

8-206. Contributo allo studio della elettrodeposizione di leghe—La constituzione dei prodotti. (Contribution to the Study of the Electrodeposition of Alloys—Constitution of the Products.) Vincenzo Montoro. *La Metallurgia Italiana,* v. 40, Jan.-Feb. 1948, p. 9-12.

The electrodeposition of Ni-Co, Cu-Sn, and Cu-Pb alloys. It was found that primary solid solutions, intermediate phases, and mixtures more or less closely associated with one of the alloy components are present. 14 ref.

8-207. Chemical Stability of Tin Coatings. (In Russian.) N. N. Gratsianskii and P. F. Kalynzhnaya. *Zhurnal Prikladnoi Khimii.* (Journal of Applied Chemistry), v. 21, April 1948, p. 341-346.

Physical and chemical characteristics of electroplated tin coatings from various baths, especially stannate and sulphuric acid, were studied, and factors influencing their chemical stability are indicated.

8-208. Sur la théorie du polissage anodique. (Theory of Anodic Polishing.) Jean Mercadié. *Comptes Rendus,* v. 226, May 10, 1948, p. 1519-1520.

A new theory emphasizes that introduction of additional substances such as alcohols, anhydrides, etc., results in reduction of the dielectric constant, thus aiding formation of the complexes required for polishing according to the theory proposed.

8-209. Electrodeposition of Gamma Manganese. David Schlain and John D. Prater. *Journal of the Electrochemical Society,* v. 94, Aug. 1948, p. 58-73.

Convenient procedures for deposition of electrolytic manganese in the flexible gamma form rather than the usual brittle alpha form. Excellent deposits were obtained on copper cathodes at current efficiencies of 62 to 72%; deposits on stainless-steel cathodes were much poorer. 23 ref.

8-210. The Electrodeposition and Properties of Tin-Zinc Alloys. J. W. Cuthbertson and R. M. Angles. *Journal of the Electrochemical Society,* v. 94, Aug. 1948, p. 73-98.

Details of experimental results obtained by the Tin Research Institute (England) since 1946, when a summary of prior work was published. Details of some early exploratory work not hitherto published and some conclusions which have been modified as a result of recent observations.

8-211. Control of Electroplating Solutions by Analysis and Observation. III. Sampling of Solutions and a Scheme for Regular Analyses. K. E. Langford. *Electroplating,* v. 1, Aug. 1948, p. 504-507.

Solutions and methods of sampling. (To be continued.)

8-212. Embrittlement of Roller Chains by Plating After Assembly. *Product Engineering,* v. 19, Sept. 1948, p. 105.

Hazards incurred when assembled precision steel roller transmission chains are electroplated. Reasons why plating of assembled steel roller chain sometimes causes failure of bushings and sideplates.

8-213. Evaluation of Strip Plating Aided by Use of Circulating Electrolyte Cell. R. A. Dimon. *Steel,* v. 123, Sept. 20, 1948, p. 116, 118, 121, 124.

Apparatus developed to duplicate in the laboratory as closely as possible conditions existing in a commercial installation.

8-214. The Influence of the Depositing Conditions on the Hardness of Chromium Deposits and the Current Ef-

ficiency. W. Eilender, H. Arend, and E. Schmidtmann. *Engineers' Digest* (American Edition), v. 5, Aug. 1948, p. 284. Translated and abstracted from *Metalloberfläche,* v. 2, March 1948, p. 49-52.

Investigations have shown that there are optimum plating-solution temperatures for each specific current density at which a hardness maximum can be found. The present practice of plating at 55° C., irrespective of the current density, to obtain a Brinell hardness of 900 is shown to be incorrect. Two different solutions were investigated from 0 to 90° C. and at current densities from 10 to 100 amps. per dm.

8-215. Controlled Production of Fissure Networks: Chromium-Plated Bearing Surfaces. *Electroplating and Metal Finishing,* v. 1, Sept. 1948, p. 605-609.

Production of porous chromium deposits. Based on American and British literature.

8-216. Thickness Testing of Electrodeposits. *Electroplating and Metal Finishing,* v. 1, Sept. 1948, p. 593-599; discussion, p. 599, 609.

Condensations of Jet-Test for Determining the Thickness of Lead Coatings, by R. A. F. Hammond; and Review of Methods of Thickness Testing, by Harold E. Egginton. Papers were presented at a recent meeting of the Electrodepositors' Technical Society.

8-217. Contribution to the Theory of the Electropolishing of Metals. (In Russian.) G. S. Vozdvizhenskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, March 1948, p. 403-406.

Critically analyzes existing theories. The solution of the active elements of the surface of the polished metal is believed to be the main factor involved. 11 ref.

8-218. Overvoltage of Hydrogen on Powdered-Iron Electrodes. (In Russian.) S. A. Rozentsveig and B. N. Kabanov. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, April 1948, p. 513-520.

The above was determined in 5 *N* NaOH. The slope of the overvoltage curve varies with degree of oxidation of the iron surface. An anomaly in the overvoltage curve at low current densities explained. 11 ref.

8-219. Zajimavy pripad korose platovaného duralu. (An Interesting Case of Corrosion of Plated Duralumin.) Ferdinand Kadlec. *Hutnické Listy,* v. 3, July 1948, p. 205-208.

Resistance to corrosion of a plated duralumin sheet varied from one side to the other. It was found that the sheet was a perfect galvanic cell. The Cu content of one plated layer was higher than that of the other, the result being polarization and short circuiting of the cell by the base metal with a consequent rapid deterioration of the anodic side. Reasons for the higher Cu content in one of the plated layers.

8-220. Plating of Die Castings. *Canadian Metals & Metallurgical Industries,* v. 11, Sept. 1948, p. 23-24, 28-29.

Methods used by Fisher Body—Ternstedt Div., General Motors Corp.

8-221. Conversion Data for Brass Solutions and Deposits. *Plating,* v. 35, Oct. 1948, p. 1014.

Data were compiled to assist the brass plater in preparing and maintaining his plating solutions.

8-222. Process Sheet for Industrial Chromium Plating. George Black. *American Machinist,* v. 92, Oct. 7, 1948, p. 135.

Recommended procedures.

8-223. Electroplating Recessed Areas With Dipolar Electrodes. Vuval C. Jones. *Iron Age,* v. 162, Oct. 7, 1948, p. 98-99.

Parts requiring plating of recesses or deposition of an extra heavy plate on a specified area are a major problem. Use of dipolar electrodes, which use stray bath current and have no direct connection to either electrode.

8-224. Lead Plating; Method of Deposition on Bronze Bearing Surfaces. H. Silman and M. F. E. Fry. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 341-342. From *Metal Industry,* v. 73, July 16, 1948, p. 48-50.

Previously abstracted from original source. See item 8-175.

8-225. Test to Destruction of an Electric Motor With Windings of Aluminum Insulated by Electrolytic Oxidation. *Engineers' Digest* (American Edition) v. 5, Sept. 1948, p. 346. Translated and condensed from *Revue de l'Aluminium,* v. 25, May 1948, p. 175.

Results of above test.

8-226. Outplating at the Verichrome Plating Co., Walsall, England. *Electroplating and Metal Finishing,* v. 1, Sept. 1948, p. 574-583.

Procedures and apparatus used by British firm which does miscellaneous job plating. (To be continued.)

8-227. Electrodeposition of Nickel from Orthophosphate Baths. C. B. F. Young and E. S. Roszkowski. *Journal of the Electrochemical Society,* v. 94, Oct. 1948, p. 176-193.

Mat and adherent nickel deposits

which can be buffed to a bright finish have been successfully electrodeposited from a solution containing nickel phosphate and phosphoric acid in various amounts at temperatures ranging from 25 to 85° C. and at current densities of 20 to 1200 amp. per sq. ft. Addition and wetting agents as a rule were found to be detrimental to the deposits. 13 ref.

8-228. Metal Plating on Non-Conductors. Charles A. Marlies. *Metal Finishing,* v. 46, Oct. 1948, p. 60-66, 74.

Uses, methods of application, production of designs, and electroplating the coating. Pitfalls, causes of failure, and means of eliminating these difficulties.

8-229. Determining Barrel Plating Costs. R. J. O'Connor. *Metal Finishing,* v. 46, Oct. 1948, p. 81-84.

Effects of size of parts, metal deposited, thickness of plate, and anode prices in relation to the final selling price.

8-230. Removal of Zinc from Bright Nickel Baths by Electrolytic Treatment. H. D. Carter. *Metal Finishing,* v. 46, Oct. 1948, p. 85-88, 129-130. Reprinted from *Metal Industry,* v. 72, Feb. 27, 1948, p. 170-173.

Previously abstracted from original. See item 8-60, 1948.

8-231. Copper Plating. *Metal Finishing,* v. 46, Oct. 1948, p. 91.

8-232. Electroplating on Aluminum Extends Use of This Material. Harold A. Knight. *Materials & Methods,* v. 28, Oct. 1948, p. 84-88.

Advantages and applications. Special reasons for Al plating; the corrosion factor, and highlights of the process.

8-233. Practical Points on Chromium Plating. Robert L. Buckley. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 626-628.

Every effort has been made to keep the terms and explanations on a purely practical basis. American practice is dealt with.

8-234. Control of Electroplating Solutions by Analysis and Observation. IV. Chemical Control of Acid Copper Plating Solutions. K. E. Langford. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 646-649.

Written for the plater with only a little chemical knowledge.

8-235 Microchemical Methods of Control of Plating Baths. F. G. Gerke, Z. I. Dreval, and V. P. Zvereva. *Electroplating and Metal Finishing,* v. 1, Sept. 1948. p. 591-592; Oct. 1948, p. 667-668, 674. Translated from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 12, 1946, p. 908-914.

Analytical methods for copper baths and for chromium-plating baths.

8-236. Electroplating Hazards and Nuisances. R. W. Oyler. *Plating,* v. 35, Nov. 1948, p. 1111-1114.

Gross-contact injuries; poisoning; injuries to the nose, throat, and lungs in particular and to all body surfaces in general, caused by air-dispersed materials; harmless but unpleasant odors; and stream pollution and similar problems.

8-237. Effect of Impurities and Purification of Electroplating Solutions; Some Effects of Copper in Nickel Plating Solutions on the Salt Spray Resistance of Nickel and Nickel-Chromium Deposits on Steel. D. T. Ewing, Robert Rominski, and William King. *Plating,* v. 35, Nov. 1948, p. 1122-1123.

Copper was found to reduce salt-spray resistance. Work was a part of A.E.S. Research Project No. 5.

8-238. Die Harte von Hartchromschichten und die Stromausbeute in Abhangigkeit von den Abscheidungsbedingungen. (Effect of Deposition Conditions on the Hardness of Hard-Chromium Layers and on the Current Consumption.) Walter Eilender, Heinrich Arend, and Eugen Schmidtmann. *Metalloberflache,* v. 2, March 1948, p. 49-52.

Shows that every current density has an optimum bath temperature at which optimum hardness is obtained. Maximum hardness is inversely proportional to current density up to about 100 amp. per sq. dm. and it decreases as the bath temperature rises or falls above or below an optimum point. In H_2SO_4 baths, the luster of the plating is directly related to its hardness.

8-239. Die Tiefenstreuung in den galvanischen Badern. (Depth Variations in Galvanic Baths.) Johannes Fischer. *Metalloberflache,* v. 2, March 1948, p. 53-60.

Unequal distribution of electric current in electroplating baths, resulting in uneven deposition of metal. Methods proposed to correct this difficulty are critically evaluated; and a nickel bath is used as an example to explain Mantzell's and Haring's results. 20 ref.

8-240. Semi-Automatic Plating; Design and Construction of Equipment. A. F. Brockington. *Metal Industry* (London), v. 73, Oct. 22, 1948, p. 326-328.

Recommended when articles are subject to frequent changes in design, or the metal is not of uniform quality.

8-241. Plating in the Recording Industry. Marvin Rubinstein. *Metal Finishing,* v. 46, Nov. 1948, p. 52-60.

Phonograph records are pressed from thermoplastic materials using metal molds known as "stampers". First step is metallizing the lacquer disk, followed by successive nickel plating, copper flashing, and electroforming the master, which is a negative replica of the lacquer disk. After several finishing operations, a "mother" or positive replica, is electroformed on the master, removed, finished, and plated to form the stamper.

8-242. Heavy Nickel Deposition as a Manufacturing Operation. S. Wernick and F. Willetts. *Metal Finishing,* v. 46, Nov. 1948, p. 76-81.

Process developed to produce "heavy" nickel coating on a cast-iron base, free from nodules and possessing physical characteristics enabling the deposit to be readily and economically ground to size.

8-243. Thickness Testing of Electroplated Coatings. *Metal Finishing,* v. 46, Nov. 1948, p. 87.

Principles, advantages, disadvantages, and remarks concerning the microscopic, the Mesle's chord, the magnetic, the chemical, and the electrochemical methods.

8-244. Electroplating Methods Used in One of the World's Largest Installations. *Machinery,* v. 55, Nov. 1948, p. 208-212.

Methods and equipment of Pontiac Motor Div.

8-245. Electropolishing Stainless Steels. Arthur P. Schulze. *Steel,* v. 123, Nov. 15, 1948, p. 109, 112, 114, 145-146, 148.

Principles, procedures, equipment, and applications. Practical value as a production tool is being demonstrated on more than 65 different types of products, parts, and assemblies. The method is designed to supplement, rather than to replace, mechanical polishing procedures.

8-246. Sur l'existence de microfissures dans les dépots de chrome électrolytique; Leur influence sur la limite de fatigue des piéces d'acier. (Existence of Microfissures in Deposits of Electrolytic Chromium; Their Influence on the Fatigue Strength of Steel Parts.) P. Bastien and A. Popoff. *Métaux & Corrosion,* v. 23, Sept. 1948, p. 191-198.

Presence of a fan-shaped acicular structure in electrodeposited chromium. This apparent structure is said actually to represent a series of small fissures. It seems that such fissures have a very unfavorable influence on the fatigue-bending strength of chromium-plated alloy steel containing 13% Cr. Causes of this phenomenon. 27 ref.

8-247. Orientierte Abscheidung von Oxyd bei der anodischen Oxydation. (The Structure of Oxide Films Formed by Anodic Oxidation). K. Huber and B. Bieri. *Helvetica Physica Acta,* v. 21, Sept. 30, 1948, p. 375-378.

The results of X-ray and electron microscopic study of oxide films on zinc.

8-248. Recovery of Defective Steel Parts by Electro-Deposition. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 398. Translated and condensed from *Machines et Métaux,* v. 32, May 1948, p. 161-162.

How steel parts which have been scrapped because of faulty machining can be salvaged by building up with electrolytic deposits of chromium or nickel.

8-249. The Metallography of Electrodeposited Surfaces. The Influence of Substrate Surfaces on Electrodeposition I. The Nature of a Metal Surface. A. T. Steer. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 629-635.

The influence of the condition of a metal surface on the electro-deposit subsequently applied. This article is an introduction to the topic. (To be continued.)

8-250. Outplating at the Verichrome Plating Co., Walsall, England. (Continued.) *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 638-645.

This installment deals with anodizing, dyeing, bright nickel plating, barrel chromium plating, the current supply, and the bronzing department. (To be concluded.)

8-251. A Study of Chemically Deposited Silver Mirrors. Raymond Morgan and Ralph D. Myers. *Journal of the Franklin Institute,* v. 246, Nov. 1948, p. 363-376.

The nature of mirrors produced by various methods was studied in order to gain information, particularly on: structure of the silver coatings; the effect of impurities; and associated chemical compounds in cases of spoilage. X-ray and electron diffraction were extensively used in the study.

8-252. The Measurement of Permeability Characteristics of Anodic Films on Aluminum. Robert L. Burwell, Jr., and Thomas P. May. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 195-213.

Various techniques for quantitative study of the permeability of anodic aluminum oxide by measurement of rates of diffusion of salts

through the film, and conductance of the film using salt solutions as electrodes. These techniques were applied to anodic films prepared by complete anodization of aluminum foil and to films separated from anodized aluminum by action of solutions of mercuric chloride. Variations of permeability accompanying changes in different factors. 22 ref.

8-253. Electrodeposition of Cobalt-Tungsten Alloys From a Citrate Bath. Walter E. Clark and M. L. Holt. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 244-252.

An aqueous bath suitable for the electrodeposition of Co-W alloys, containing approximately 50% W. The bath contains cobalt sulphate, sodium tungstate, and citric acid in the approximate mole ratio 1:1:1.5. Bright cathode deposits are obtained over a wide range of current densities. Anodes of Co or of W or both, or of some inert material, may be used.

8-254. Codeposition of Tungsten and Iron From an Aqueous Ammoniacal Citrate Bath. M. H. Lietzke and M. L. Holt. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 252-261.

New aqueous plating bath. Experiments on three baths having different concentrations of sodium tungstate. The bath proposed is also suitable for the electrodeposition of Ni-W and Co-W alloys.

8-255. The Effect of Pressure on Current Efficiency of Copper Electrodeposition From Cyanide Solutions. Roy E. Webb and Henry B. Linford. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 261-270.

The efficiency is improved by decreasing the total pressure on the bath. A simple mathematical relationship relating deposition efficiency to pressure and current density. Possible applications.

8-256. The Electrodeposition of Lead from Lead p-Toluene Sulfonate Solutions. Frank C. Mathers and John C. Griess, Jr. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 46N-50N.

A method for preparation of p-toluene sulphonic acid. Effects of a number of addition agents on cathode deposits of lead from solutions. Smooth solid deposits were obtained by the use of aloes residue combined with glue. Aloin, thymol, 4-hydroxy-1, 3-dimethylbenzene, and eugenol were less effective. Throwing power was found to be about half that of the fluosilicate bath. Conductivity of the bath containing 20% free acid was equal to that of the fluosilicate bath containing 7% free acid.

8-257. Platings for Machine Parts: Their Selection and Application for Decorative and Functional Purposes. C. L. Faust and Wm. H. Safranek. *Machine Design,* v. 20, Nov. 1948, p. 145-148.

Discussion of the properties and applicabilities of the various types.

8-258. Electroformed Parts May Be Your Answer. *American Machinist,* v. 92, Nov. 18, 1948, p. 107-111.

The electro-forming process and some of its applications.

8-259. Electroformed Moulds for Plastics and Die-Casting Dies. *Nickel Bulletin,* v. 21, Aug-Sept. 1948, p. 109-112.

The process reviewed consists essentially of accurate machining or carving in plastics, of a master to which a high degree of finish is given. A thick shell of hard nickel is electroformed and levelled at the back with a deposit of copper. The shell is removed from the master and given a mirror finish; after machining the back, it is mounted in a steel bolster. The main advantage lies in the relative ease of cutting, finishing, and checking a positive master as compared with a negative cavity in steel.

8-260. Alliages legers speciaux pour le polissage electrolytique. (Special Light Alloys for Electropolishing.) Jean Herenguel and Roger Segond. *Revue de l'Aluminium,* v. 25, Oct. 1948, p. 306-310.

Proposes two Al-Mg alloys containing 3 and 5% Mg, respectively. Their structures, properties, and optimum conditions for heat treatment and electropolishing.

8-261. Removing Carbonate From Copper Cyanide Plating Solutions. H. F. Ross. *Metal Progress,* v. 54, Nov. 1948, p. 687-688.

Addition of 0.6 oz. per gal. of CaC_2 for each oz. per gal. of carbonate produced the desired results.

8-262. Practical Application of Modern Products. *Products Finishing,* v. 13, Nov. 1948, p. 100-102, 104, 106, 108.

Modern zinc-plating installation and conveyerized galvanizing process.

8-263. Cadmium Plating; Causes of Defects and Suggested Remedies. *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 691-694.

8-264. Control of Electroplating Solutions by Analysis and Observation. V. The Control of Cyanide Copper Solutions. K. E. Langford. *Electroplating*

and Metal Finishing, v. 1, Nov. 1948, p. 695-698.

8-265. Plastics and Plating. *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 700-707.

Actual and potential applications of thermoplastic materials in metal-finishing plant and accessories in the light of new methods of fabrication.

8-266. Outplating at the Verichrome Plating Co. (Concluded.) *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 718-719, 723.

Maintenance and control and the spray shop.

8-267. Electroplating Alloys From Cyanide Baths. J. B. Mohler. *Iron Age,* v. 162, Nov. 25, 1948, p. 84-88.

Theory and practice of plating brass, bronze, and other alloys from the cyanide and alkaline-cyanide baths.

8-268. Operational Formulas for Electrotinning Steel Strip. John H. Mort. *Iron Age,* v. 162, Dec. 2, 1948, p. 104-110.

Conclusions to be drawn from development and production work and operational formulas involved. Special slide rules and nomographs, designed to speed or eliminate time-consuming calculations; methods by which calculations shortcuts can be designed for and applied to electrotinning line control.

8-269. Composite Plated Coatings Measured Magnetically. *Iron Age,* v. 162, Dec. 2, 1948, p. 110.

Method for measuring total thickness of Cu-Ni composite coatings on steel within about 10% and thickness of each component layer to within about 15%.

8-270. Process Sheet for Rhodium Plating. George Black. *American Machinist,* v. 92, Dec. 2, 1948, p. 117.

8-271. A Process for the Electroforming of Nozzles. John W. Andersen. *Review of Scientific Instruments,* v. 19, Nov. 1948, p. 822-823.

Rapid and accurate method for producing nozzles with specialized inside contours. The process was developed in response to a need for the production of a constant-velocity-profile nozzle for use in Bunsen flame-speed measurements and other research purposes.

8-272. Batch Electropolishing. J. F. Kreml. *Steel Processing,* v. 34, Nov. 1948, p. 589-591, 594.

Development of improved procedure as applied to small parts such as screws, bolts, rivets, and fish hooks of stainless steel.

8-273. Copper Plating. R. M. Wagner. *Plating,* v. 35, Dec. 1948, p. 1212-1215.

Historical development and current production practice in decorative plating of exterior automotive parts.

8-274. Adhesion of Electrodeposits. Charles L. Faust and Arthur W. Hothersall. *Plating,* v. 35, Dec. 1948, p. 1221, 1270.

Exchange of letters on the suggestion that the words "adhesive strength" be used to denote the force required to separate the coating at the interface between itself and the base metal surface. "Bond strength" should be measured by the force required to separate the plate from the base metal regardless of the place of fracture. One may have perfect adhesion with all degrees of bond strength.

8-275. Current Reversal Devices for PR Plating in the Laboratory. A Device With Electronic Timing. Harold J. Read and Robert W. Hall. **A Device With Mechanical Timing.** H. L. Pinkerton. *Plating,* v. 35, Dec. 1948, p. 1222-1225.

8-276. Physical Properties of Electrodeposited Metals. I. Nickel. A Progress Report. A. Brenner and C. W. Jennings. *Plating,* v. 35, Dec. 1948, p. 1228-1231, 1234-1239.

Great variation in the properties of electrodeposited nickel can be obtained by deposition under different conditions. Experimental procedure and compositions of plating solutions used. Variations in mechanical properties with thickness of deposit, deposition conditions, and type of bath. Effects of these factors on structure of deposits.

8-277. Two-Tone Plating Procedures—Gold and Chrome. *Die Castings,* v. 6, Dec. 1948, p. 48-51.

Use of masking to permit development of production-line method, applied to die-cast Zn radiator ornaments.

8-278. Selecting Protective Finishes for Springs. Ronald F. Pond. *Machine Design,* v. 20, Dec. 1948, p. 128-132, 194, 196.

Factors involved including appearance, protection vs. corrosion and abrasion, kind of material in the spring, surface characteristics of material to be finished, deflection required, size of springs, and proportions of springs. Emphasis is on plating, although other finishes are also mentioned.

8-279. Electro-Plating in a Railway Shop. T. R. Boggess. *Metal Finishing,* v. 46, Dec. 1948, p. 60-62, 77.

Equipment and miscellaneous ap-

plications in N. & W. shops, Roanoke, Va.

8-280. Electrodeposited Zinc Coatings. Rick Mansell. *Metal Finishing,* v. 46, Dec. 1948, p. 63-69.

Zinc plating baths; surface preparation prior to zinc plating; cyanide zinc plating; bright zinc plating; typical procedure for bright zinc plating of aircraft parts; passivation of zinc coatings; acid zinc plating; and fluoborate zinc baths.

8-281. Chromizing Steel Surfaces—Applications. Edward Rosen and George Black. *Metal Finishing,* v. 46, Dec. 1948, p. 70-71.

The variety of applications used successfully by the German war machine. Various parts chromized in England.

8-282. Electrolytic Polishing of Brass Pressings. P. Berger. *Metal Finishing,* v. 46, Dec. 1948, p. 72-77. Reprinted from *Sheet Metal Industries.*

A preliminary investigation of three processes described in the patent literature (none of which proved satisfactory) and the development of a satisfactory process. The bath developed was a mixture of phosphoric and chromic acids plus sodium dichromate. This was further improved by use of sulphuric, hydrofluoric, and propionic acids. Operating conditions, applicability, the production cycle, and control and maintenance of the bath.

8-283. Anodizing of Aluminum Alloys. *Metal Finishing,* v. 46, Dec. 1948, p. 83.

Outline of six methods, their advantages and disadvantages.

8-284. Electroforming Difficult Shapes. W. H. Prine. *Product Engineering,* v. 19, Dec. 1948, p. 86-89.

Possibilities in joining, forming dies, bonding abrasives, reproducing detail, eliminating costly machining, and making complex, accurate shapes by electrodeposition upon a shaped mandrel.

8-285. Sur une méthode pratique de polissage électrolytique des aciers et du chrome en vue de l'examen micrographique. (Practical Method for Electrolytic Polishing of Steel and Chromium on the Basis of Micrographic Investigations.) Pierre A. Jacquet. *Comptes Rendus,* v. 227, Sept. 13, 1948, p. 556-558.

Composition of a new electrolyte and optimum conditions of the process. Advantages claimed are low cost and long life of the electrolyte and wide temperature range of operation.

8-286. Experiments on the Electrodeposition of Brass From Cyanide Solutions. Tarapada Banerjee and A. J. Allmand. *Transactions of the Faraday Society,* v. 44, Oct. 1948, p. 819-833.

Results of a fundamental study. Zn-Cu alloys containing 0.98 to 99.13% Cu were deposited, and their structures examined by X-ray methods. Extensive information on the structural transformations and ranges of the various phases. 14 ref.

8-287. Laboratory Control of Electroplating Processes. Ronald P. Marshall. *Metallurgia,* v. 39, Nov. 1948, p. 11-12.

Close cooperation between the foreman plater and the plant chemist. A specific example for cyanide zinc solutions.

8-288. Electroplating and Electroforming. John G. Beach. *Metals Review,* v. 21, Dec. 1948, p. 5, 7.

Fundamental and practical advances reported in the technical literature for the past 18 months. References to "A.S.M. Review of Current Metal Literature."

8-289. Deposition of Precious Metal Alloys. Part I. Attempts to Deposit Silver-Platinum-Gold Alloys From Alkaline Solutions. A. K. Graham, S. Hieman, and H. L. Pinkerton. *Plating,* v. 35, Dec. 1948, p. 1217-1219.

Object of investigation was the deposition of a 60%-Ag, 20%-Au, 20%-Pt alloy on sterling silver. This first installment gives details of a number of unsuccessful attempts. Bath compositions and operating conditions. 19 ref. (To be continued.)

8-290. Contributo alla conoscenza dei processi di lucidatura elettrolitica dei metalli. (Contribution to Knowledge Concerning the Electropolishing of Metals.) R. Piontelli, D. Porta, and L. Arduini. *La Metallurgia Italiana,* v. 39, Jan.-Feb. 1947, p. 15-23.

A new device for experimental study of the electropolishing process. A method for plotting the curve of anodic density as function of time at a constant voltage. Several factors influencing the process.

8-291. Der Aufbau galvanischer Legierungsniederschläge. 4. Die Silber-Kadmium-Legierungen. 5. Die Silber-Zink-Legierungen. (The Structure of Alloy Electrodeposits. 4. Silver- Cadmium Alloys. 5. Silver-Zinc Alloys.) Ernst Raub and Bernhard Wullhorst. *Metallforschung,* v. 2, Feb. 1947, p. 33-45.

Deposition conditions, structures and properties of the deposits, and effects of heat treatment.

8-292. Der Zustand elektrolytisch abteschiedener Metalle und seine Abhängigkeit von den Abscheidungsbedin-

gungen. (The Properties of Electrodeposited Metals and Their Dependence on Depositing Conditions.) Ernst Raub. *Metallforschung,* v. 2, March 1947, p. 87-96.

Results of a comprehensive study of electrodeposited zinc and silver. Microstructures were determined by X-ray and by metallographic examination. The effect of heat treating on the properties of Ag deposits.

8-293. Abblättern und Abschälen von Vernicklungen. II. (Peeling and Scaling of Nickel Plating. II.) T. Richards. *Metalloberfläche,* v. 1, Aug. 1947, p. 197-199.

Factors which cause nickel-plated articles to peel and scale. 52 ref.

8-294. Die elektrolytische Abescheidung von Legierungen aus wässrigen Lösungen. (The Electrolytic Deposition of Alloys From Aqueous Solutions.) Johannes Fischer. *Metalloberfläche,* v. 1, Oct. 1947, p. 229-234; Nov.-Dec. 1947, p. 252-256.

Principles and procedures, including methods of examining the deposits with regard to properties and structure. Types of baths which were successfully used for deposition of alloys of noble metals, and of iron and copper. Experimental data.

8-295. Some of the Effects of Cadmium, Zinc, and Tin Plating on Springs. John R. Gustafson. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 782-798; discussion, p. 799-802.

Previously abstracted from preprint. See item 8-63, 1948.

8-296, Electrodeposited Silver on Steel for Glass-to-Metal Seals. Norman S. Freedman. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 325-336; discussion, p. 336.

Previously abstracted from preprint. See item 8-60, 1947.

SECTION IX

PHYSICAL AND MECHANICAL TESTING

9a—General

9a-1. The Significance of Mechanical Testing. H. E. Davies and J. McKeown. *Metallurgia,* v. 37, Nov. 1947, p. 19-22.

9a-2. Mechanical Testing of Materials by the Torsion Method. Ya. B. Fridman. *Metallurgia,* v. 37, Nov. 1947, p. 53-54. Based on paper in *Zavodskaya Laboratoriya,* v. 11, no. 9, 1945, p. 852.

Compares the four basic methods of loading and points out disadvantages of methods other than torsion for cases in which it is important to determine mechanical properties under conditions of considerable deformation. When, however, it is necessary to reveal resistance to rupture tension or bend testing is recommended.

9a-3. Laboratory for Mechanical Testing at Very Low Temperatures. John L. Zambrow. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 4-9.

Facilities at Ohio State.

9a-4. A Recording Dilatometer for Metallurgical Research. J. O. Lord. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 9-11.

Piece of apparatus for studying dimensional changes from about −300 to 2400° F. at Ohio State.

9a-5. Fatigue Testing Production Parts. C. B. Griffin. *Iron Age,* v. 161, Jan. 8, 1948, p. 59-62.

A machine developed by General Motors for fatigue testing full-size parts and assemblies; method of operation.

9a-6. Determination of the Yield Point on the Basis of the "Magnetic Diagram of Elongation". (In Russian.) M. V. Dekxtiar, L. M. Baldina, and V. A. Kirichkova. *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1056-1063.

Since elongation diagrams for non-standard specimens cannot usually be produced on tensile test machines, a new method was developed based on the variation of magnetic permeability with applied stress. The curves of such variation are called "magnetic diagrams of elongation". 11 ref.

9a-7. Method for Evaluation of Plasticity in Notches. (In Russian.) L. M. Pevzner. *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1105-1112.

Relationships between deformation characteristics and impact strengths. A few tests were made on magnesium from −195 to 250° C., but most of the work was done on a Cr-Ni-Mo steel. In general changes in plasticity with temperature are not parallel to those in impact strength. 17 ref.

9a-8. The Choice of a Basic Method for Determination of the Hardness of Metals. (In Russian.) M. M. Khrushchov. *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1121-1128.

An experimental comparative study of different methods. The Vickers method is considered most exact but the methods of Brinell and Rockwell are recommended in special cases. 13 ref.

9a-9. A 150-Ton Universal Structure Testing Machine. *Engineer,* v. 184, Dec. 26, 1947, p. 594-596.

Construction of a machine designed by W. and T. Avery, Ltd., Birmingham, England.

9a-10. A New Hardness Tester of the Poldi Steel Works. V. Jares. *Engineers Digest* (American Edition), v. 4, Dec. 1947, p. 582. Translated and condensed from *Strojnicky Obzor,* v. 27, 1947, p. 213-214.

Tester is based on the Vickers principle, but is characterized by its simplicity without sacrifice of accuracy. Its weight is only about 14 lb., and the load is applied through a helical spring which is accurately calibrated and preloaded by a hand lever.

9a-11. How to Construct a Stress-Strain Diagram by Hardness Measurements. N. N. Davidenkov. *Metallurgia,* v. 37, Dec. 1947, p. 102-104. Translated

from *Zhurnal Technicheskoi Fiziki* (Journal of Technical Physics), v. 13, no. 7-8, 1945, p. 389.

Basic principles of a method utilizing the usual Brinell hardness tests without making an actual tensile test.

9a-12. Metallic Abrasives; Methods of Testing and Evaluation. J. E. Hurst. *Iron and Steel,* v. 21, Jan. 1948, p. 18-22.

9a-13. Rupture Testing in a 48-Bar Furnace. J. D. Nisbet. *Iron Age,* v. 161, Feb. 12, 1948, p. 81-82.

The largest rupture-testing furnace ever built, including some of the unusual construction features that make this unit flexible and accurate.

9a-14. Methods of Testing Metallic Abrasives. J. E. Hurst. *Foundry Trade Journal,* v. 84, Jan. 22, 1948, p. 73-80; discussion, p. 80.

(Presented at annual meeting of Institute of Vitreous Enamellers.)

9a-15. 150-Ton Structure-Testing Machine. *Engineering,* v. 165, Jan. 23, 1948, p. 79-82, 84.

New British machine.

9a-16. Investigation of the Elongation Diagram and Determination of the Yield Point by Means of a Magnetic Method. (In Russian.) M. V. Dekhtyar. *Zhurnal Teknicheskoi Fiziki* (Journal of Technical Physics), v. 17, Oct. 1947, p. 1111-1118.

Method for investigating the elongation of ferromagnetic materials on the basis of the sign of the increment of magnetic susceptibility. This method makes it possible to determine stresses corresponding to the beginning of plastic deformation of individual grains (the limit of elasticity) and also the yield point.

9a-17. A Method for Hardness Testing of Very Small Structural Parts. (In Russian.) A. D. Kuritsyna, E. S. Berkovich, and M. M. Khrushchov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1227-1233.

Use of a Russian microhardness testing apparatus for items such as parts of watches or precision instruments. Hardness numbers are obtained in Vickers or Brinell units.

9a-18. Determination of Impact Strength of Thin Sheet Material. (In Russian.) Ya. S. Yakovleva and M. V. Yakutovich. *Zavodskaya Laboratoriya,* (Factory Laboratory), v. 13, Oct. 1947, p. 1263-1266.

Test specimens, apparatus, and procedure.

9a-19. A Method for Mechanical Testing at Low Temperatures. (In Russian.) E. M. Shevandin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1268-1269; also Brutcher Translation No. 2047 under title, **Precautions to Be Taken in Tests for Mechanical Properties at Subzero Temperatures,** 4 pages, Henry Brutcher, Altadena, Calif.

Precautions to be observed during use of liquid air to obtain the desired temperatures, including use of suitable insulating materials.

9a-20. Testing the Superalloys. T. Y. Wilson. *Instrumentation,* v. 3, 1st Quarter, 1948, p. 12-13.

Methods used by Allegheny Ludlum high alloy laboratories.

9a-21. Fatigue Testing With Particular Reference to Tests at Elevated Temperatures. J. McKeowen. *Journal of the Birmingham Metallurgical Society,* v. 27, Dec. 1947, p. 423-432; discussion, p. 432-442.

The effect of temperature on fatigue properties as well as the effects of rate of strain and conditions of stress and strain. Data of Moore and colleagues and of Fergusson and Bouton relative to effect of number of cycles of strain per hour on life of lead specimens. Also describes the Wöhler tests—rotating specimen with specific stress and nonrotating specimen with specific strain.

9a-22. A Micro-Indenter for Use With a Metallurgical Microscope. T. A. Crawshaw. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Jan. 1948, p. 13-14.

Simple device can be attached to a metallurgical microscope in order to make small impressions with a standard Vickers pyramid diamond.

9a-23. Two New British Microhardness Testers. *Industrial Diamond Review,* v. 8, Feb. 1948, p. 59-60, 62.

9a-24. Calculation of the Moment of Torsion Failure by Use of a Diagram of True Stresses. (In Russian.) M. P. Markovets. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1476-1481.

Proposes a new formula for determination of the moment for cylindrical metal rods which exhibit shearing fracture during tensile and torsion testing.

9a-25. Apparatus for Determination of the Hardness of Metals. (In Russian.) A. V. Antonovich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1501-1502.

A new apparatus for determination of Brinell or Vickers hardness, which has the advantage of greater portability than other types. The

unique feature of the equipment is application of the load by means of a calibrated spring. The microscope, which is an integral part, permits measurement of the impression with an accuracy of ± 0.0001 mm. Disadvantage is necessity for frequent recalibration.

9a-26. Lock Washer Torsion Test Provides Unmistakably Clear Results. *Steel,* v. 122, March 15, 1948, p. 126.

Improved apparatus developed by Westinghouse.

9a-27. Adams Lecture for 1947—Structural Strength of the Welded Joint. G. S. Mikhalapov. *Welding Journal,* v. 27, March 1948, p. 193-206.

Tests designed to study the mechanism of failure in the welded joint. Data on wide-plate and hatch-corner tension-test specimens. Studies of high-velocity impact using direct-explosive tests made on welded and unwelded plates. (Presented at 28th annual meeting, A.W.S., week of Oct. 19, 1947.)

9a-28. Abrasion Testing of Anodized Coatings. Arthur P. Schulze. *Products Finishing,* v. 12, March 1948, p. 66, 68, 70, 72.

Use of instrument known as the Taber Abraser.

9a-29. Methods of Testing Metallic Abrasives. J. E. Hurst. *Metallurgia,* v. 37, Feb. 1948, p. 205-210.

Previously abstracted from *Iron and Steel,* v. 21, Jan. 1948, p. 18-22. See item 9a-12, R.M.L., 1948.

9a-30. Gage Length Marker for Tensile Test Specimens. *Iron Age,* v. 161, April 29, 1948, p. 93.

Increased accuracy and speed in routine marking of gage lengths on tensile test specimens is said to have resulted from the use of a specially built marker developed by a British firm.

9a-31. Fatigue Testing Heavy Structures. *Iron Age,* v. 161, May 13, 1948, p. 77.

Testing of structures up to 1500 lb. in weight at Douglas Aircraft Co., by means of a heavy-duty vibration table. The procedure is said to be applicable to making vibration tests on washing machines, portable and automobile radio equipment, and other automotive accessories as well as any other piece of moving equipment.

9a-32. Fatigue Testing Heavy Structures. George Sachs. *Iron Age,* v. 161, May 13, 1948, p. 78-83.

Characteristics of strain-aging. Lists 72 references covering some 40 years' study on various aspects of the subject, as well as the various criteria suggested and used for establishing the susceptibility of a steel to strain aging.

9a-33. New Creep Testing Machines. Joseph Marin. *Automotive Industries,* v. 98, May 15, 1948, p. 46-47, 78.

In the past, most creep tests have been made on specimens subjected to simple static tensile stresses. Recently, several static-tension; static-torsion; static-bending; fluctuating-tension; and fluctuating, torsion-tension, creep-testing machines were developed at The Pennsylvania State College.

9a-34. Testing, Instrumentation and Inspection. T. P. Nordin. *Metals Review,* v. 21, May 1948, p. 3, 5, 7, 9.

Reviews literature for past year. References to "A.S.M. Review of Current Metal Literature."

9a-35. Tools for Testing. *Metals Review,* v. 21, May 1948, p. 11, 13, 15, 17, 19, 21, 23.

A review of testing and inspection equipment for the metal industries introduced during the past year.

9a-36. Influence of Size and Shape of Specimens on Their Fatigue Strength. (In Russian.) I. A. Oding. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R., 1946, p. 141-156.

"Dimensional factor" should not be considered by itself but only in connection with composition, crystal structure, heat treatment, and geometrical shape (also notch type, if present). 38 ref.

9a-37. Shape and Dimensional Factors Under the Influence of Alternating Stresses. (In Russian.) N. N. Afanas'ev. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U. S. S. R., 1946, p. 157-167.

Formulas for the determination of "effective coefficient of stress concentration", which is defined as the relation between the fatigue strength of a plain specimen and that of a notched specimen of the same material. 20 ref.

9a-38. Influence of Dimensional Factors on the Propensity of Crystalline Bodies Toward Brittle Fracture. (In Russian.) F. F. Vitman. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R., 1946, p. 168-177.

After thorough theoretical and experimental investigation, it was concluded that the fundamental cause of the presence of a dimensional factor is the impossibility of

fulfillment of one of the conditions of similarity—namely a corresponding distribution of different defects. 25 ref.

9a-39. Statistical Theory of Dimensional Factors. (In Russian.) T. A. Kontorova. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R., 1946, p.178-184.

Results of a theoretical investigation of the influence of the dimensional factor on the behavior of brittle materials in the critical brittleness interval.

9a-40. Method for the Absolute Measurement of Dynamic Properties of Linear Structures at Sonic Frequencies. W. James Lyons and Irven B. Prettyman. *Journal of Applied Physics,* v. 19, May 1948, p. 473-480.

Method, including theory, whereby dynamic stretch modulus, coefficient of internal friction, and hysteretic energy loss of textile yarns and cords can be accurately determined at longitudinal vibration frequencies above 100 cycles per sec. The method is applicable also to glass cords, and metallic wires and cables.

9a-41. Machine for Testing Gear Materials and Lubricants. *Machinery* (London), v. 72, May 13, 1948, p. 593-595.

New machine developed in Britain. The peripheries of two disks, rotating with either equal or different circumferential speeds, are pressed into contact under predetermined loads. Besides determining ultimate failure loads for materials and oils, the machine also permits determination of coefficient of friction between the disks under any operating conditions.

9a-42. Effect of Fatigue on Tension-Impact Resistance. William H. Hoppmann, II. *American Society for Testing Materials, Preprint* No. 29, 1948, 2 pages.

Possibility of using the high-velocity tension-impact test to determine the loss of impact resistance caused by fatigue in metals. Tension specimens from a low-carbon steel plate in a known fatigue condition were subjected to impact tests at various velocities up to 120 ft. per sec. Energy and total elongation as functions of impact velocity.

9a-43. Hardness Testing of Soft Metals. T. H. Gray. *Iron Age,* v. 161, June 24, 1948, p. 82-87, 94.

Reasons why metals with hardness below 400 Diamond Pyramid Hardness present problems not ordinarily encountered in testing of heat treated steels. Various well-known and accepted types of apparatus for testing metals of low hardness, and influence of metallurgical characteristics on reliability of test results.

9a-44. Metallurgical Books. Sibyl E. Warren. *Metals Review,* v. 21, June 1948, p. 41, 43.

Fourth installment of bibliography of books published 1936-46. Sections on testing and mechanical properties and on corrosion and oxidation. (To be continued.)

9a-45. De betekenis van het heen-en weerbuiggetal voor de beoordeling van plaatmetaal. (Use of the Bending Test as a Criterion of the Properties of Sheet Metal.) J. H. Palm. *Metalen,* v. 2, June 1948, p. 210-221.

Recommends use of alternate bending number as a criterion of the ductility of sheet metal. Advantages over the cupping test. (English abstract summarizes expermental results.)

9a-46. High Temperature Creep Testing. H. V. Kinsey. *Canadian Metals & Metallurgical Industries,* v. 11, June 1948, p. 19-22, 34.

Canadian laboratory facilities for measuring creep of metals at temperatures up to 2100° F.

9a-47. Testing Machinability. Robert Hutcheson. *Modern Machine Shop,* v. 21, July 1948, p. 180, 182, 184, 186, 188.

A new dynamometer type of machinability tester which will enable any average machine operator to conduct a rapid and accurate test on a sample of metal in the lathe. Instrument measures the vertical or tangential cutting force imposed on the tool, and this factor alone is a reliable measure of machinability.

9a-48. A Combined Creep Machine and X-Ray Spectrometer. H. J. Tapsell, H. V. Pollard, and W. A. Wood. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 198-199.

The machine is used in the study of the mechanical properties of metals in relation to X-ray structure, particularly their creep behavior at elevated temperatures. Special features permit X-ray examination at various times during creep under a stress which is kept constant throughout the period of uniform stretching, and while the specimen is oscillating about its axis and the X-ray film oscillating in its own plane.

9a-49. The Testing of Rotors for Fatigue Life. Jonathan Winson. *Journal*

of Aeronautical Sciences, v. 15, July 1948, p. 392-402.

An experimental method for fatigue testing of articulated rotor blades consists in application of specified second harmonic control to a rotor revolving on a stationary whirl stand. Such a test can induce blade fatigue stresses approximating those met in flight.

9a-50. Non-Destructive Test Methods. Benson Carlin. *Product Engineering,* v. 19, July 1948, p. 129-132.

Seven basic methods.

9a-51. Notch Tensile Testing. J. D. Lubahn. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 90-132.

Knowledge necessary for successful notch-tensile testing and its interpretation. It is necessary to know, for a variety of notch shapes, the location of initial fracture and the state of stress and strain at the point of initial fracture. Existing knowledge as to the distribution of stress and strain in a notch is said to be inadequate. Valid conclusions also require knowledge concerning other variables. 38 ref.

9a-52. Size Effects in Steels and Other Metals From Slow Notch Bend Tests. Paul E. Shearin, Arthur E. Ruark, and R. M. Trimble. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 167-188.

Special apparatus developed for high-precision measurement of the above. Factors studied were: orientation, cleanliness, austenitic grain size, hardness level, change in microstructure associated with varying temperatures of isothermal transformation, and temper embrittlement. Results for Ni-Cr steel and for 24-ST aluminum samples in various sizes and shapes.

9a-53. Some New Testing Machines for Combined Stress Experiments. Joseph Marin. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40B), 1948, p. 189-200.

Previously abstracted from *Automotive Industries,* v. 98, May 15, 1948, p. 46-47, 78. See item 9a-33, 1948.

9a-54. The Tensile Test. A. H. Cottrell. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 69-72; discussion, p. 73-74.

Fundamental principles.

9a-55. Pre-Stressing of Springs. J. A. Pope. *Wire Industry,* v. 15, July 1948, p. 455-456.

Results obtained from preliminary static torsion tests on overstrained specimens of carbon spring steel. This exploratory work gives a picture of the type of change in properties in a torsionally overstrained bar, the overall effect of the change on apparent properties of the bar, and possible limitations which have to be observed in order to obtain maximum benefit from pre-stressing alone.

9a-56. Testing Machine Aids Industrial Research at University of Washington. Howard E. Jackson. *Modern Industrial Press,* v. 10, July 1948, p. 46, 48, 50.

1200-ton-capacity testing machine and some of the work done with it since its recent installation. It has been used for tests on aircraft-wing panels, on a laminated Douglas Fir beam (12 x 24 in.), on 40-in. diameter concrete culvert pipes, and on a test slab used in connection with bridge design.

9a-57. Micro-Hardness Testing; A Consideration of the Special Problems Involved. *Metal Industry,* v. 73, July 9, 1948, p. 26, 33.

Reviews several recent papers.

9a-58. Methods and Instruments for Hardness Testing. A. M. White. *Steel,* v. 123, July 26, 1948, p. 74-76, 78, 80, 82.

Definitions of hardness suggested by numerous investigators since Aristotle; a discussion of the development of hardness testers based on scratch, rebound, penetration, magnetic, and electrical principles; common testers in use today.

9a-59. High-Temperature Disk-Forging Developments for Aircraft Gas Turbines. L. B. Fonda. *Transactions of the American Society of Mechanical Engineers,* v. 70, Jan. 1948, p. 1-9; discussion, p. 9-12.

Concerned chiefly with the Type I-40 turbine wheel for jet engine of the P-80 airplane. Of interest are conclusions drawn from bursting tests carried out on 179 turbine-wheel blanks and six bucketed turbine wheels. Equipment used, various alloys and forging practices, and results obtained. The most important consideration was found to be ductility; the best method of obtaining it—proper control of grain flow. Inspection methods developed were a combination of zyglo and supersonic testing.

9a-60. Fatigue Testing; a Rapid Machine Employing Unmachined Specimens. *Automobile Engineer,* v. 38, July 1948, p. 278.

Apparatus at the 6th International Congress of Applied Mechanics, Par-

is. A strip-type specimen is held as a cantilever, and with aid of an electromagnet is caused to vibrate at a frequency slightly below resonance. When a crack develops the amplitude of vibration increases. Once a fracture is initiated, crack growth continues with an ever-increasing rapidity. The fatigue test result is obtained within an hour.

9a-61. Effects of Strength and Ductility on Burst Characteristics of Rotating Disks. Arthur G. Holms and Joseph E. Jenkins. *National Advisory Committee for Aeronautics, Technical Note* No. 1667, July 1948, 52 pages.

Results of an investigation conducted to determine influence of strength and ductility on room-temperature burst characteristics of solid disks, disks with large-diameter central holes, and disks with small-diameter central holes. The disk materials consisted of steel, beryllium-copper, aluminum-base alloy, brass, stainless and a nickel-base alloy.

9a-62. What is Strength? (Concluded.) J. B. Caine. *Foundry,* v. 76, Aug. 1948, p. 100-101, 166, 168, 170.

Influence of fatigue strength on the serviceability of castings. Need for more information on notched fatigue strength of cast and wrought metals, which need is made evident by a comparison between strength of severely notched and unnotched specimens. Need for more information on corroding fatigue of cast metals and surfaces. Nondestructive test methods.

9a-63. Magnetic Testing Symposium Features the 1948 A.S.T.M. Meeting. *Electrical Manufacturing,* v. 42, Aug. 1948, p. 121-125, 218, 220.

Papers and discussion covered at the 51st annual session of the society, which included in the symposium, quality control and sampling methods, reports on corrosion tests, plastics and other materials basic to the product designer.

9a-64. A Simple, Accurate Microhardness Testing Device. E. Boerje Bergsman. *Metal Progress,* v. 54, Aug. 1948, p. 183-188.

This apparatus uses an inverted metallographic microscope, whereby the exact location of the spot to be tested can be fixed. The objective is then replaced by another holder in which a pyramidal diamond is accurately centered, and specimen is lowered onto the diamond's point. A counterbalanced lever system regulates the pressure between diamond and specimen between limits of 0.5 and 500 g., and the resulting impression is measured by micrometer eyepiece in the usual manner. Several routine laboratory investigations made with this equipment.

9a-65. New Wire Fatigue Testing Method. F. A. Votta, Jr. *Iron Age,* v. 162, Aug. 12, 1948, p. 78-81.

A simplified and rapid, yet highly accurate method for obtaining fatigue strength and endurance limit values to serve as quality indexes. Of interest to both the wire manufacturer and consumer, the method is said to make possible production control and material acceptance on the basis of modern statistical methods.

9a-66. Comparative Tests on Creep of a Ring Specimen in Bending and of a Cylindrical Specimen in Tension. (In Russian.) I. A. Oding and S. I. Matveyev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 595-607.

A special type of ring specimen for the creep test. Shape and dimensions are indicated. Test apparatus, including electrical circuit and a comparison of the data obtained from such specimens with that from the usual type of specimens.

9a-67. A New Method of Determining Plasticity. (In Russian.) U. M. Chizhikov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 608-613.

A new method of determining the plasticity of ferrous and nonferrous metals in different conditions of deformation. The theoretical bases and the test procedure.

9a-68. The Measurement of the Damping Capacity of Metals in Torsional Vibration. G. A. Cottell, K. M. Entwistle, and F. C. Thompson. *Journal of the Institute of Metals,* v. 74, March 1948, p. 373-417.

The cause of the discrepancy between the results of "mechanical" and "physical" methods of measuring damping capacity in torsional vibration was investigated. In a machine of the Föppl-Pertz type the energy loss in the machine itself may, when testing a material of low damping capacity, amount to about 500 or more times the intrinsic energy dissipation of the specimen. All the major sources of loss have been isolated, and complete redesign of an existing machine has reduced the measured damping to twice the lowest values measured by the physical method.

9a-69. The Estimation of Specific Damping Capacity From Measurements of Experimental Decay Curves.

G. L. J. Bailey. *Journal of the Institute of Metals,* v. 74, March 1948, p. 417-424.

This article is an appendix to the one preceding it. (See above abstract.) A method for treating experimental decay curves is proposed and explained which permits estimation of specific damping capacity at any measured amplitude within calculable limits of error.

9a-70. Micro-Hardness Testing of Metals. E. Wilfred Taylor. *Journal of the Institute of Metals,* v. 74, June 1948, p. 493-500.

When an indenter is used, the impressions made are usually large in relation to the microstructure of the specimen. Desirability of a form of hardness test which can be applied to a particular crystal or to a small selected area, and the factors controlling the application of very light loads to a diamond indenter. A new micro-hardness tester having the above characteristics is described.

9a-71. Discussion of the Forces Acting in Tension Impact Tests of Materials. D. S. Clark and P. E. Duwez. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers.* v. 70), Sept. 1948, p. 243-247.

A method for measuring the forces acting on a specimen during a tension-impact test. The method of computing force-time relations in a specimen subjected to tension impact from the standpoint of the theory of the propagation of elastic and plastic strain. The method was applied to a specimen of S.A.E. 1020 cold rolled steel to illustrate the procedure. 11 ref.

9a-72. A Method of Making High-Speed Compression Tests on Small Copper Cylinders. E. T. Habib. *Journal of Applied Mechanics,* v. 15. *(Transactions of The American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 248-255.

In mechanical gages used to measure the pressure from an underwater explosion, small copper cylinders are compressed at high speeds. Test apparatus designed for dynamic calibration of these cylinders and results obtained.

9a-73. Calibration of Testing Machines With Proving Ring. D. H. Rowland. *Metal Progress,* v. 54, Sept. 1948, p. 347-348.

Apparatus and procedure. The ring deflection is measured by means of an internally-mounted micrometer screw and vibrating reed. The screw carries an anvil or button whose travel is accurately measured by means of a graduated dial.

9a-74. Hardness Testing of Electrodeposits. 1. Basic Methods of Test. C. W. Smith. *Electroplating and Metal Finishing,* v. 1, Sept. 1948, p. 563-571.

Various methods, but mainly nondestructive micro methods and apparatus.

9a-75. The Process of Scratching of Metals. (In Russian.) E. N. Maslov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 834-839.

Mathematically analyzes the process as applied to hardness testing. On the basis of obtained results, use of the force necessary to produce a groove of a certain width as a measure of hardness is proposed. A modified Martens tensometer is suggested for such determinations.

9a-76. Determination of the Temperature Coefficient of the Modulus of Elasticity of Sheet Metal During Bending. (In Russian.) A. N. Malinkovich and I. M. Roitman. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 839-842.

A new type of apparatus permitting the recording of very small deformations by means of an optical system.

9a-77. Determination of Energy of Impact by Means of an Electrical Dynamometer. (In Russian.) L. D. Sokolov and L. P. Zaitsev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 843-847.

Proposes, for use in impact testing, a newly developed installation using electronic principles. An illustrative test and sample calculations.

9a-78. Method for Testing of Metals Using Tube-Shaped Specimens. (In Russian.) T. A. Vladimirskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 847-857.

Tensile test method; superior accuracy in comparison with method using standard specimens is claimed.

9a-79. Apparatus for Torsion Testing of Small Specimens. (In Russian.) P. D. Novokreshchenov and N. E. Markova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 887-888.

Apparatus and typical results.

9a-80. Preparation of Specimens for Compression Testing. (In Russian.) V. B. Shlumper. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 888-889.

Technique is briefly described and diagrammed.

9a-81. Micro-Hardness Testing of Metals. E. Wilfred Taylor. *Engineering,* v. 166, Sept. 10, 1948, p. 261-264. A condensation.

See abstract from *Journal of the Institute of Metals,* v. 74, June 1948, p. 493-500, item 9a-70, 1948.

9a-82. The Abrasion Resistance of Metals. R. D. Haworth, Jr. *American Society for Metals, Preprint* No. 42, 1948, 36 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 819-854; discussion, p. 854-869.

A new testing machine with which it is possible to determine quantitatively the resistance of metals to either dry or wet abrasion. Weight-loss values obtained under several abrasive conditions are presented for a variety of metallic materials.

9a-83. Test Turbines Near 100,000 Rpm. *Aviation Week,* v. 49, Oct. 4, 1948, p. 21.

Steel pits built to study effects on blades of high speed and temperatures up to 1750° F.

9a-84. Simple Method of Determination of the Dynamic Hardness of Metals by Means of Double-Pointed Cones. (In Russian.) F. F. Vitman and B. S. Joffe. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 727-732.

Method and apparatus. Its theoretical basis and practical applications.

9a-85. The Problem of the Determination of Fatigue Strength Limits. (In Russian.) A. I. Kochetov and A. D. Krolevetskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 732-738.

Critically investigated Weller's method of fatigue-curve plotting. A simpler method is described.

9a-86. A New Fatigue-Testing Machine. (In Russian.) S. I. Yatskevich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 739-741.

Theoretical bases of the method and a formula for determination of relative errors.

9a-87. Additional Stresses in Fatigue Test Specimens. (In Russian.) S. G. Kheifets. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 742-748.

Heat developed during operation of the cantilever fatigue-test machine, caused by irregularity of the test specimens, results in additional stresses which change the true fatigue strength of the material. Methods of calculation of such stresses.

9a-88. Small Size Creep-Test Machine. (In Russian.) M. L. Bernshtein. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 760-761.

New apparatus: 22″ x 20″ x 18″, and its characteristics.

9a-89. A Rotating-Load, Elevated Temperature Fatigue-Testing Machine. J. McKeown and L. H. Black. *Metallurgia,* v. 38, Sept. 1948, p. 247-254.

A new machine designed and constructed in the laboratories of the British Non-Ferrous Metals Research Association.

9a-90. Hardness Testing of Electrodeposits. II. Laboratory & Commercial Instruments. C. W. Smith. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 653-661.

Instruments for microhardness testing and methods of use.

9a-91. Obtaining Fatigue-Test Data. J. A. Sauer and P. K. Roos. *Machine Design,* v. 20, Oct 1948, p. 115-117, 158, 160, 162.

Methods of use of the Sonntag fatigue-testing machine, the development and construction of which were described by B. J. Lazan in an article in the May 1947 issue. The machine is primarily suited for superposition of static loads so that mean stresses other than zero can be studied.

9a-92. The Use of Flat-Ended Projectiles for Determining Dynamic Yield Stress. I. Theoretical Considerations. Geoffrey Taylor. **II. Tests on Various Metallic Materials.** A. C. Whiffin. **III. Changes in Microstructure Caused by Deformation Under Impact at High-Striking Velocities.** W. E. Carrington and Marie L. V. Gayler. *Proceedings of the Royal Society,* ser. A., v. 194, Sept. 2, 1948, p. 289-331.

In Part II, the experimental technique devised to apply the method studied theoretically in Part I is described. Results of application to various steels, duralumin, copper, lead, iron, and silver. In Part III, the mechanism of the deformation was studied by examination of microstructures. The amounts of residual strain in mild steel and duralumin were determined by observing microstructural changes on annealing. Hardness surveys were also made.

9a-93. Notch Impact Sensitivity. (In Russian.) N. N. Davidenkov and S. E. Belyaev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 963-968.

Proposes a new quantitative formula for "notch effect". According to this formula, yield point of the notched specimen minus yield point of a simple test specimen is divided by the latter value to give a coeffi-

cient which may be either positive or negative. The value of such a coefficient is indicated by the experimental results.

9a-94. Influence of Offset During Investigation of Torsion. (In Russian.) I. M. Roitman and Ya. B. Fridman. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 969-972.

Indicates, on the basis of experimental investigation, that offset of specimens up to 4° does not show marked effect on the results of normal torsion tests on most of the materials which are fractured by shearing action.

9a-95. Method of Determination of Microhardness During Investigation of Thin Metallic Surface Layers. (In Russian.) B. I. Kostetskii and P. K. Topekha. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 972-977.

Techniques and apparatus for microhardness testing of metallic surface layers deposited by plating, dipping, or otherwise. Typical results, showing impressions made by the pyramid indenter.

9a-96. Apparatus for Determining the Hardness of Gears. (In Russian.) T. A. Vvedenskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 1016.

Apparatus is described and diagrammed. Calculations show method of interpretation of results.

9a-97. 5,000,000-Lb. Testing Machine. *Mechanical Engineering,* v. 70, Nov. 1948, p. 900-902.

Machine in the aeronautical Structures Laboratory, U. S. Naval Experimental Station, Philadelphia. Arrangements for use by industry are planned.

9a-98. Creep Measurement With Wire Gauges. *Electrical Engineering,* v. 67, Nov. 1948, p. 1049.

Use of SR-4 bonded resistance-wire strain gages instead of the conventional extensometer as reported by the Canadian Bureau of Mines. This method is said to be simple, accurate, and sensitive, and avoids the problem of attaching cumbersome and inconvenient mechanical devices to test specimens.

9a-99. Navy Using Largest Test Machine. *Aviation Week,* v. 49, Nov. 8, 1948, p. 33.

New 2500-ton-capacity Baldwin unit at Philadelphia Navy Yard which is available to manufacturers for tests of aircraft, automotive, ship, and gun assemblies.

9a-100. Micro- and Macro-Deformations of Metals and Alloys Under Longitudinal Impact Loads. Part II. Georges Welter. *Metallurgia,* v. 38, Oct. 1948, p. 328-330.

A second testing method and apparatus. The difference between the first and the second series of tests was that, although a pendulum-type loading system was retained, the specimen did not move with the hammer, but was rigidly fixed in the base of the machine. However, results were unsatisfactory, hence use of pendulum-impact devices was abandoned. (To be continued.)

9a-101. Essais des matériaux dans l'industrie métallurgique. (Testing of Materials of the Metallurgical Industry.) (Also in German.) A. Meyer. *Pro-Metal,* v. 3, May 1948, p. 68-74, 79-83.

The most important methods used in Switzerland for the determination of physical, chemical, and mechanical characteristics of finished products. A table indicating the characteristics of standard copper alloys, depending on their cold working and heat treatment. (To be continued.)

9a-102. Strain Gage for Testing Sheet Metal at High Temperature. Glen Guarnieri and James Miller. *Metal Progress,* v. 54, Nov. 1948, p. 692-694.

An extensometer and instrumental setup that utilizes eight strain gages, so mounted as to cancel out numerous variables and record a single equated value at any instant.

9a-103. Two New Methods for Testing Triaxial Specimens. Georges Welter. *Welding Journal,* v. 27, Nov. 1948, p. 529s-536s.

Mechanical and hydrostatic loading devices, methods for their use, and preliminary results obtained. Some results for steel and 17ST aluminum.

9a-104. Significance of Proportional Limit and Yield Strength. John L. Everhart. *Iron Age,* v. 162, Dec. 2, 1948, p. 111-113.

Mechanical limitations in accurately determining proportional limit values of many metals. Advocates use of yield strength as a more specific physical-property criterion.

9a-105. Deformed Volume. (In Russian.) Ya. B. Fridman and A. A. Bat. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1124-1130.

Introduction of a new three-dimensional theory for test specimens under stress instead of the commonly used two-dimensional theory. Shows that this theory gives a more accurate interpretation of mechanical-test data.

9a-106. Micro and Macro-Deformations of Metals and Alloys Under Longitudinal Impact Loads. Part III. Georges Welter. *Metallurgia,* v. 39, Nov. 1948, p. 13-17.

A new method and apparatus for application of either dynamic tension or compression. Presents typical data obtained for 24ST aluminum, AM57S magnesium, S.A.E.1020 steel, annealed medium-C steel, and Monel K. Superiority over those obtainable by other methods is claimed.

9a-107. Damping Capacity. R. F. Hanstock. *Metal Industry,* v. 73, Nov. 12, 1948, p. 383-385; Nov. 19, 1948, p. 411-413.

The usefulness of damping capacity measurements for investigation of the properties and constitution of metals and alloys. It is shown that these measurements are also of value in estimating the probability of fatigue failures under specified conditions.

9a-108. Methods of Testing Creep Resistant Alloys. Wilfred Francis Coxon. *Materials & Methods,* v. 28, Dec. 1948, p. 76-78.

Recent developments in treating and testing creep resistant alloys.

9a-109. A Mechanical Test for Detecting Longitudinal Fissures in Fine Wire. D. W. White. *Metal Progress,* v. 54, Dec. 1948, p. 837-841.

Test, designated as the "knife-edge" test, determines the ability of a wire to withstand tension over a relatively sharp knife edge of known radius of curvature while being rotated about its longitudinal axis. Straining the specimen in this way will cause fracture of a wire having flaws. The test is being used for quality-control inspection of semifinished tungsten wire for lamp filaments. Possible application to other kinds of wire.

9a-110. A Laboratory Evaluation of the Hot-Working Characteristics of Metals. C. L. Clark and J. J. Russ. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 736-748; discussion, p. 777-790.

The hot twist test is of value in providing rapid and inexpensive means for selecting the most suitable temperature for hot processing operations.

9a-111. Uber Scherfestigkeitsprufungen von Lötungen. (Determining the Shear Strength of Solders.) Friedrich Trey. *Metallforschung,* v. 2, March 1947, p. 84-86.

A method for determining the shearing strength of soldered joints. The test results are evaluated and compared with earlier results.

9a-112. The Velocity Aspect of Tension-Impact Testing. William H. Hoppmann, II. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 533-544; discussion, p. 545.

Previously abstracted from preprint. See item 9-86, 1947.

9a-113. Influence of Plastic Extension and Compression on the Fracture Stress of Metals. D. J. McAdam, Jr., G. W. Geil, and W. D. Jenkins. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 554-572; discussion, p. 573-574.

Previously abstracted from preprint. See item 9-114, 1947.

9a-114. Creep and Creep-Rupture Testing. G. V. Smith, W. G. Benz, and R. F. Miller. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 615-635; discussion, p. 636-638.

9a-115. The Progress of Failure in Metals as Traced by Changes in Magnetic and Electrical Properties. P. E. Cavanagh. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 639-647; discussion, p. 648-650.

Previously abstracted from preprint. See item 9-85, 1947.

9b—Ferrous

9b-1. Evaluation of Steel for Welded Structures to Be Exposed to Low Temperatures. (In Russian.) A. E. Asnis *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1100-1105.

The impact strength of a special welded test specimen is claimed to indicate satisfactorily the applicability of steels for structural use at temperatures as low as −45° C. Specifications for the specimens; the test method; test results for a series of six steels.

9b-2. Some Notes on Tensile Testing. Frank W. Sowa. *Iron Age,* v. 161, Jan. 22, 1948, p. 68-69.

The manner in which workhardening of steel takes place, and the effect of rate of loading on test data, were investigated. Notch effects compared with results obtained on unnotched specimens.

9b-3. Spin Disks in "Whirl Pit" to Test Steel and Welds. *Welding Journal,* v. 27, Jan. 1948, p. 93-94.

Application in a research program now going on at M.I.T. sponsored by the Welding Research Council of the Engineering Foundation.

9b-4. Notch Toughness of Steel Plates. D. F. Windenburg. *Product Engineering,* v. 19, Feb. 1948, p. 110-113.

Work being done under Navy sponsorship on measurement of notch toughness of steel plates for

the purpose of determining the causes of failure in welded merchant ships and means of eliminating or minimizing it. Details of the test specimen developed to show the transition from ductile to brittle fracture in plate specimens of appreciable size. Typical test results compared with Charpy test results show wide variance.

9b-5. Ferromagnetic Metals; Identification and Measurement of Internal Stresses. Part I—Magnetic Tests. Albert Borowik. *Iron and Steel,* v. 21, Jan. 1948, p. 3-6.

Results of experimental investigation. (To be continued.)

9b-6. Impact Testing of Steels and Alloys at High Temperatures. (In Russian.) A. B. Al'tman and G. V. Estulin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1218-1221.

A specially designed furnace and testing apparatus. Results of testing of carbon steel, with and without 0.1% Pb, from 800 to 1200° C., and of 18-8 stainless steels containing Ti, and also W, at 20, 600 and 700° C.

9b-7. Notch Effect in Cold Brittleness of Steel. II. Method of Determination of Cold Brittleness of Notched Pieces. (In Russian). E. M. Shevandin. *Zhurnal Teknicheskoi Fiziki* (Journal of Technical Physics), v. 17, Oct. 1947, p. 1119-1136.

The influence of notch shape on the critical temperature of brittleness of soft iron at different rates of stress application was investigated. On the basis of the data obtained, a diagram showing the dependence of cold brittleness on rate of deformation, test temperature, and notch-shape factors, is presented. 10 ref.

9b-8. The Significance of Mechanical Testing. H. E. Davies. *Journal of the Birmingham Metallurgical Society,* v. 27, Dec. 1947, p. 412-422; discussion, p. 434-442.

Tensile, ductility, and shock-resistance tests of ferrous materials.

9b-9. Determination of the Breaking Strength of Hard Annealed Steel. (In Russian.) G. N. Margolin, B. A. Prozdovskii, and P. I. Orlets. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Nov. 1947, p. 1387-1399.

The causes of the failure of the breaking strength of notched specimens using an isostatic test to agree with that resulting from the Charpy impact test were thoroughly investigated and were found to be related to several metallurgical factors. The data obtained.

9b-10. Determination of the Mechanical Properties of Steel Without Use of Tensile Specimens. (In Russian.) M. F. Sichikov, B. P. Zakharov, and Iu. V. Kozlova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1463-1471; discussion, p. 1471.

The possibility of indirect determination of the four basic factors involved in mechanical strength (tensile strength, yield point, per cent elongation, and per cent reduction of area) by use of a cone indenter was investigated theoretically and experimentally. Results so far are favorable, but further work is needed for complete verification. The editor comments adversely.

9b-11. Comparative Results of Impact Tests on Solid and Composite Test Specimens. (In Russian.) G. I. Pogodin-Alekseev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1472-1475.

The solid specimens were 10 x 10 mm. in cross section. The composite ones consisted of two 10 x 5 mm. specimens, butt welded together or joined together in other ways either parallel to the direction of load application or perpendicular to it. Results for different types of steel are tabulated and charted. They are of value in determining the strength of machines or structures in which the simple forms investigated are likely components.

9b-12. The Correlation of Laboratory Tests With Full-Scale Ship Plate Fracture Tests. E. P. Klier, F. C. Wagner and M. Gensamer. *Welding Journal,* v. 27, Feb. 1948, p. 71s-96s; discussion, p. 96s.

Notch-impact tests conducted on merchant vessel quality ship plate. Tests have been conducted so as to establish the energy absorption vs. temperature curves for selected steels having widely separated temperatures of transition from ductile to brittle failure. Microstructure of the steels used. 18 ref.

9b-13. Development of Cleavage Fractures in Mild Steels. A. B. Bagsar. *Welding Journal,* v. 27, March 1948, p. 97s-123s.

Susceptibility of several types and thicknesses of mild steel of ship plate and pressure vessel qualities and of samples of welds to development of cleavage or brittle fractures has been determined by a new test, termed the cleavage-tear test, in which a notched tensile-bend type of test coupon is used. (Presented at annual meeting, Atlantic City, Dec. 1-5, 1947, of the American Society of Mechanical Engineers.)

9b-14. Cleavage Fracturing and Transition Temperatures of Mild Steels. A. B. Bagsar. *Welding Journal,* v. 27, March 1948, p. 123s-131s.

Effects of eccentricity of loading, section depth and thickness, notch geometry, temperature of testing, rate of loading, and heat treatments as determined by a cleavage-tear test. Several grades of ship plate and pressure vessel steels of rimmed, semikilled, and killed qualities covering a thickness range of ½ to 2¼ in. and several sections of butt welds made by manual and submerged-arc processes were investigated. Equations were derived expressing combined effects of section and notch geometries on development of cleavage fractures.

9b-15. Some New Aspects of the Fatigue of Metals Brought Out by Brittle Transition Temperature Tests. C. W. MacGregor and N. Grossman. *Welding Journal,* v. 27, March 1948, p. 132s-143s; discussion, p. 143s-144s.

Effect of prior cycles of fatigue on brittle transition temperature and on brittle fracture strength are determined for S.A.E. 1020 steel. Notched fatigue specimens were fractured at appropriate transition temperatures in a special slow-bend testing machine at controlled strain rates after being subjected to various numbers of cycles of fatigue at several stress levels. It was found that as the number of cycles at a given stress level (both above and below the endurance limit) increased, brittle transition temperature increased through a broad range of temperatures, and brittle fracture strength decreased greatly. 36 ref.

9b-16. The Effect of Variation in Notch Severity on the Transition Temperature of Ship Plate Steel in the Notched-Bar Impact Test. R. S. Zeno and J. R. Low, Jr. *Welding Journal,* v. 27, March 1948, p. 145s-147s.

An investigation made to determine transition temperatures of two ship plate steels for various notch severities in the Charpy impact test. Standard Charpy specimens that ranged from square, unnotched bars to standard V-notch bars containing shallow fatigue cracks at the bottom of the notch were used.

9b-17. Supplementary Statement on "A Comparison of the Brittle Transition Temperatures as Determined by the Charpy Impact and the M.I.T. Slow-Bend Tests". C. W. MacGregor and N. Grossman. *Welding Journal,* v. 27, March 1948, p. 159s-160s.

Refers to article published in Jan. issue. Gives additional information.

9b-18. Measurement of Breaking Energy in Notched Rail Impact Test. M. Perrey. *Engineers' Digest,* v. 5, Feb. 1948, p. 85-87. Translated and condensed from *Revue de Métallurgie,* v. 43, 1946, p. 336-346.

Previously abstracted from original paper. See R.M.L., v. 4, 1947, item 9-124.

9b-19. Torsional Fatigue of Marine-Engine Shafting. *Engineering,* v. 165, March 5, 1948, p. 229-230.

Reviews and discusses "Large Scale Torsional Fatigue Testing of Marine Shafting", by S. F. Dorey, presented at meeting of Applied Mechanics Group, Institution of Mechanical Engineers, Feb. 13, 1948. The experimental procedure consisted of subjecting the shafts to a succession of 10 million stress cycles at regular increments of stress until failure occurred.

9b-20. Large-Scale Torsional Fatigue Testing of Marine Shafting. S. F. Dorey. *Engineer,* v. 185, Feb. 20, 1948, p. 183-185; discussion, p. 188-189. A condensation.

Previously abstracted from *Engineering,* v. 165, March 19, 1948, p. 286-288; March 26, 1948, p. 310-312. See item 9b-19, R.M.L., 1948. (Presented at meeting of Institution of Mechanical Engineers, Feb. 1948.)

9b-21. Torsional-Fatigue Testing of Marine Shafting. S. F. Dorey. *Engineering,* v. 165, March 19, 1948, p. 286-288; March 26, 1948, p. 310-312.

Experimental procedure and results obtained. The method consisted of subjecting the shafts to a large number of strèss cycles until failure occurred. This usually took place around 10,000,000 cycles.

9b-22. Contribution a la Qualification Mécanique des Fontes Grises et a l'Amélioration de Leur Comportement en Service. (Mechanical Testing of Gray Cast Iron and Improvement of Its Properties for Practical Applications.) Albert Collaud. *Fonderie,* Dec. 1947, p. 949-952; discussion, p. 954-959.

States that classification of gray cast iron should be made on the basis of two separate methods: A simple static test characterizing the strength and toughness and also indicating the distribution of graphite; and a simple dynamic test characterizing tenacity and ductility of the material.

9b-23. Les Essais Mécaniques des Fontes Grises. (Mechanical Testing of Gray Cast Iron.) Jacques Prache. *Fonderie,* Dec. 1947, p. 952-954; discussion, p. 954-959.

The possibility of application of methods used for steel.

9b-24. Stress-Rupture Characteristics of Various Steels in Steam at 1200° F. J. T. Agnew, G. A. Hawkins, and H. L. Solberg. *Engineering Experiment Station, Purdue University, Research Series* No. 101, May, 1947, 62 pages.

An investigation in which small tensile specimens made from low-carbon; C-Mo; 2¼% Cr-1% Mo; 5% Cr-Mo-Si; 9% Cr-Mo-Si; 12% Cr; 18% Cr-8% Ni; 25% Cr-20% Ni; and 5% Cr-Mo-Ti steels, were placed in a steam reaction chamber at 1200° F. and stressed in tension for periods of time ranging from 10 hours to 7700 hours. Time to rupture, elongation, reduction in area, depth of scale layer, and type and angle of fracture. 33 ref.

9b-25. Production Hardness Testing in a Malleable Shop. C. Schneider and L. Ulsenheimer. *American Foundrymen's Association, Preprint* No. 48-25, 1948, 5 pages.

Two methods for measuring Brinell hardness of pearlitic malleable castings. The first is the method of applying the Brinell load of 3000 kg. through a 10-mm. ball. The diameter of the impression is measured and this value is converted to Brinell hardness number. The second uses a direct-reading machine by applying first a 1500-kg. pre-load, resetting the dial to zero, and then applying a 3000-kg. load. The dial on the machine then indicates the hardness of the casting. Sources of error.

9b-26. Development of Cleavage Fractures in Mild Steels. A. B. Bagsar. *American Society of Mechanical Engineers, Paper* No. 47-A-75 (Advance Copy.), 1947, 43 pages.

Previously abstracted from *Welding Journal,* v. 27, March 1948, p. 97S-123S. See item 9b-13, 1948.

9b-27. A Method of Evaluating Transition From Shear to Cleavage Failure in Ship Plate and Its Correlation With Large-Scale Plate Tests. Noah A. Kahn and Emil A. Imbembo. *Welding Journal,* v. 27, April 1948, p. 169s-182s; disdiscussion, p. 182s-185s, 216s.

The "tear test" described utilizes a notched test specimen 3 x 5 in. x full plate thickness, which is asymmetrically loaded in static tension to complete failure under controlled temperature conditions. The load-extension diagram obtained for each specimen indicates the energy input required to start initial failure and to propagate the fracture to completion. (Presented at 28th Anual Meeting, A.W.S., Chicago, Oct. 19, 1947.)

9b-28. A Study of Slotted Tensile Specimens for Evaluating the Toughness of Structural Steel. H. R. Thomas and D. F. Widenburg. *Welding Journal,* v. 27, April 1948, p. 209s-215s; discussion, p. 215s-216s.

Slotted tensile specimens of rimmed and killed-steel plate were tested to determine the effect of temperature, sharpness of the notch at the ends of the slot, and ratio of the length of the slot to the width of the plate, and the tensile strength and on energy for fracture, and also to determine the transition temperature from shear to cleavage fracture. Results of tests on 6 and 12-in. wide specimens of a rimmed steel and of 12-in.-wide specimens of killed steel. (Presented at 28th Annual Meeting, A.W.S., Chicago, Week of Oct. 19, 1947.)

9b-29. Cold Brittleness of Steel Under Tensile Stress. (In Russian.) D. M. Zagorodskikh. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Jan. 1948, p. 85-88.

A series of tests performed on low-carbon steel specimens showed that the critical temperature of brittleness in impact bending does not change its value if specimens are under tensile stress, even close to the yield point, if both sides of specimen are clamped.

9b-30. The Meaning and Measurement of Transition Temperature. R. D. Stout and L. J. McGeady. *Welding Journal,* v. 27, June 1948, p. 299s-302s.

The writers believe that there has been too little consideration given to the part played by criterion for evaluating the "transition temperature" of the steels in interpreting fracture test results. Importance of this factor. 17 ref.

9b-31. Developments in High-Speed Rotating Disk Research at M.I.T. C. W. MacGregor and W. D. Tierney. *Welding Journal,* v. 27, June 1948, p. 303s-309s.

Development of the whirl pit and various auxiliary equipment for large-scale testing of steel plates under high-speed rotation. Results of pilot tests on disks having various methods of support, both welded and unwelded. Typical bursts and flow patterns.

9b-32. Testing Speed Limitations for Committee A-1 Specifications for Steel. Lawford H. Fry. *American Society for Testing Materials, Preprint* No. 98, 1948, 3 pages.

Effect of speed in tension testing is considered in its relation to the acceptance specifications of Committee A-1 on Steel.

9b-33. Anisotropie elastique d'une feuille mince d'invar laminée a froid. (Elastic Anisotropy of a Thin Cold-Rolled Sheet of Invar.) Pierre-Jean Bouchet *Comptes Rendus* (France), v. 126, April 12, 1948, p. 1168-1169..

It was found that the determina tion of Young's modulus gave a more exact picture than the usual yield-point, tensile-strength, and elongation-to-failure tests.

9b-34. Production of Ferrite Single Crystals. F. G. Stone. *Metals Technology,* v. 15, June 1948, T. N. 3, p. 3-5.

Strain-anneal process for the production of iron tensile-test specimens, the gage length consisting substantially of a single crystal. The essential feature of the method is the continuous slow increase of furnace temperature during the grain-growth annealing treatment.

9b-35. What is Strength? J. B. Caine. *Foundry,* v. 76, July 1948, p. 80-81, 148, 150, 152, 154.

Shows that the standard tension test does not give a true picture of service strength. The development of stress concentration under non-uniform loading, whether due to the loading or to the shape of the part, is of primary importance. The pros and cons of the notched-impact test as a substitute for tension testing of steel castings. (To be continued.)

9b-36. Impact Testing of Weldments. William C. Long. *Metal Progress,* v. 54, July 1948, p. 43-45.

Development of special test devices for evaluating the quality of small steel assemblies, electrically butt welded. No correlation was found between impact and tensile-test results. Guillotine-type impact testers now used for production-line inspection of automotive shock-absorber parts.

9b-37. Dynamic Hot Hardness Testing With Special Reference to Isothermal Transformations. George M. Enos, George J. Peer, and James C. Holzwarth. *Metal Progress,* v. 54, July 1948, p. 51-55.

To investigate some irregularities in hardening a die steel, a quick determination of its martensite start point was made by a series of punch marks during air cooling. The method used seemed to have wider utility, hence some trials were made to determine the TTT-curves of two steels with fairly high alloy content. Results on S.A.E. 52100 checked published S-curves and were verified by examination of microstructures.

9b-38. Les essais mecaniques des fontes grises. (Mechanical Testing of Gray Cast Iron.) Jacques Prache. *Fonderie,* v. 28, April 1948, p. 1113-1118.

Different procedures, and use of a simple tensile test on special cast specimens. Author believes that this method gives more precise information than other tests.

9b-39. Application of the Brinell Test in the Foundry. J. Leonard. *Foundry Trade Journal,* v. 85, July 1, 1948, p. 3-5.

Data indicate that the Brinell test may be suitable for evaluating the uniformity of mechanical properties throughout a given ferrous casting. (Exchange paper from the Association Technique de Fonderie de Belgique.)

9b-40. Testing Turbine Wheels. *Aero Digest,* v. 57, Aug. 1948, p. 57.

Method for proving high-test, heat resistant steel alloys by subjecting disks of such materials to centrifugal force of 35,000 r.p.m. and temperature up to 1750° F. High-speed photographs enable engineers to study test wheels as they break.

9b-41. "Eye-Dropper" Method of Testing Steel. *Blast Furnace and Steel Plant,* v. 36, Aug. 1948, p. 976.

Liquid steel fresh from the furnace is drawn up into a tube. The steel hardens into a smooth, homogeneous rod within five minutes, the glass is cracked from it, and the rod is ready to be checked for quality.

9b-42. High Speed Photographs of Water Jet in the End-Quench Test. Robert A. Buchanan. *Metal Progress,* v. 54, Aug. 1948, p. 180-181.

This series of five stroboscopic photographs show the initial stages in end-quenching a red-hot bar of standardized manner.

9b-43. Strain Testing Improves Iron Alloy Machine Parts. H. M. Hardy and T. O. Kuivinen. *Product Engineering,* v. 19, Aug. 1948, p. 116-120.

Investigation made of the possibility of reducing stress concentration at the crankpin fillets of a Meehanite crackshaft designed for a 9 in. bore diesel engine. Investigations on a compressor cylinder, and Meehanite beams.

9b-44. Ubermikroskopische Abbildung von Stahlbruchflächen. (Electron-Microscopic Photographs of Steel Fractures.) Hans Mahl. *Metallforschung,* v. 2, June, 1947, p. 186-188.

Photographing of steel fractures by the impression method and its use in structure examinations.

**9b-45. Zur Frage der Prufung und Bewertung der mechanischen Eigen-

schaften von Sinterwerkstoffen. (Testing and Evaluating the Mechanical Properties of Sintered Materials.) Wilhelm Jung-König and Gunter Wassermann. *Metallforschung,* v. 2, July-Aug. 1947, p. 244-249.

Methods and results of testing the mechanical properties of sintered iron specimens.

9b-46. Rate of Propagation of Fatigue Cracks in 12 by 3/4-In. Steel Plates With Severe Geometrical Stress-Raisers. Wilbur M. Wilson and James L. Burke. *Welding Journal,* v. 27, Aug. 1948, p. 405s-408s.

Object of the tests is to determine to what extent the rate of propagation of fatigue cracks in plates is related to Charpy notch impact value of the steel. A comparison was made of the relative effect of fatigue cracks and jeweler's saw cuts on rate of propagation of fatigue cracks.

9b-47. Flexural Fatigue Strength of Steel Beams. Wilbur M. Wilson. *Welding Journal,* v. 27, Aug. 1948, p. 409s-417s.

The stringers of through bridges and beams of short beam-spans are subjected to a large number of stress cycles, and the dead load stress found to be very small. The principal purpose of the investigation is to determine relative fatigue strengths of various kinds of flexural members.

9b-48. Tensile and Elasticity Testing of Steel Roller Chain. *Product Engineering,* v. 19, Sept. 1948, p. 121.

Design of grip jaws and procedure for testing standard steel roller chain as recommended by the Association of Roller and Silent Chain Manufacturers.

9b-49. The Influence of the Dimensional Factors on the Mode of Yielding and Fracture in Medium-Carbon Steel. I. The Geometry and Size of the Flat Tensile Bar. Julius Miklowitz. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 274-287.

Results of a detailed study of the local principal strains, during uniform straining in a flat tension bar, which has proved valuable in explaining the observed large variations of the local necking strains with uniform changes in geometry and size of the bar. Analogy between the restraining action of the bar heads on the gage material, and that of the neck material on the flowing material adjacent to it. 18 ref.

9b-50. X-Ray Investigation of Residual Stresses of Types II and III During Fatigue Testing of Steel. (In Russian.) Yu. S. Terminasov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, April 1948, p. 517-523.

X-ray criteria of the fatigue limit; the proposed criterion is the abrupt variation of intensity of the X-ray lines corresponding to the appearance of third-order residual stresses. which takes place only after the fatigue limit has been attained.

9b-51. Talks About Steelmaking: Toughness. Harry Brearley. *British Steelmaker,* v. 14, Sept. 1948, p. 422-424.

Test methods.

9b-52. Method for Determining the Mechanical Properties of Steel Cables. (In Russian.) D. G. Zhitkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 858-867.

A newly developed apparatus, which gives simultaneous determinations of tensile strength, fatigue strength, and yield point.

9b-53. An Impact Test for Cast Iron. *Nickel Bulletin,* v. 21, July 1948, p. 94-97. Based on "The Development of a Single Blow Impact Test for Cast Iron," A. B. Everest, J. W. Grant, and H. Morrogh, *Journal of the Iron and Steel Institute,* v. 152, 1945, p. 403-423.

9b-54. An End-Quenched Bar for Deep Hardening Steels. Gerrit DeVries. *American Society for Metals, Preprint* No. 22, 1948, 12 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 678-688; discussion, p. 688-691.

A test to give the relative hardenabilities of deep-hardening steels. A 1 x 6-in. bar is end-quenched in a fixture so constructed that the top of the bar is kept at approximately 1200° F. This makes the temperature in the bar a function of the distance from the quenched end and allows the steel in the bar to transform isothermally at the various temperatures. The amount of transformation at each temperature is determined by making hardness measurements along the side of the bar.

9b-55. Torsion or Flexion? An Examination of Test. *Wire Industry,* v. 15, Oct. 1948, p. 668.

Pros and cons of the two test methods, as applied to wire rope.

9b-56. Determination of Young's Modulus and the Shear Modulus of Certain Steels at 20 to 600° C. by an Electronic Technique. (In Russian.) M. M. Pisarevskii. *Kotloturbostroenie.* (Boiler

and Turbine Manufacture), May-June 1948, p. 24-26.

A new method using a sound generator and an audio-frequency amplifier. Dependences of Young's modulus of shear, and Poisson's coefficient for a series of steels used in boiler manufacture.

9b-57. Impact Strength of Steel Under Compressive Stress. (In Russian.) D. M. Zagorodskikh. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 1010-1012.

A specially developed test apparatus is used. Data derived.

9b-58. Cold Brittleness of Steel Under Compressive Stress. (In Russian.) D. M. Zagorodskikh. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 843-846.

A specially developed test apparatus; and a method for mathematical analysis of the experimental data. As an example, data for low-carbon steel are presented.

9b-59. Gray Iron Transverse Test Bars. Jack H. Schaum. *Foundry,* v. 76, Dec. 1948, p. 68-71, 216.

Common defects found in commercial transverse test bars and techniques developed at the Naval Research Laboratory for improving the casting and testing of such bars. 10 ref. (To be concluded.)

9b-60. Zugschwellfestigkeit gleichartig gekerbter Stahlstäbe mit verschiedener Querschnittgröss. (Pulsating Tensile Loading Strength of Uniformly Notched Steel Bars With Different Cross Sectional Areas.) Franz Bollenrath and Heinrich Cornelius. *Metallforschung,* v. 2, Jan. 1947, p. 9-11.

Test proved that a certain amount of plastic deformation is characteristic of the fatigue strength of a steel and that the strength of a test bar is determined by its notch radius rather than by the cross section of the bar.

9b-61. Calculation of Tensile Strength and Yield Point From the Chemical Composition and Cooling Rate. I. R. Kramer, P. D. Gorsuch, and D. L. Newhouse. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 244-271; discussion, p. 271-272.

Previously abstracted from *Metals Technology,* v. 13, Sept. 1946, TP 2067. See item 9-123, 1946.

9c—Nonferrous

9c-1. Concerning the Applicability of Laboratory Tests for Determination of the Life of Machine Parts. (In Russian.) A. I. Chinizhenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1113-1120.

Up to now, no universally accepted coefficient for calculation of wear has appeared. A new coefficient taking into consideration the specific gravity of the metal and the operating conditions is proposed, and a formula is derived which expresses the amount of wear in terms of cu.mm. per sq.cm. of surface under a given load for a "friction path" of 1 km. Results for different bearing metals.

9c-2. Pressure and Creep Tests at Constant Hoop Stress on Lead and Alloy "E" Pipes. A. Latin. *Journal of the Institute of Metals,* v. 74, Jan. 1948, p. 259-289.

A method of testing lead and lead-alloy pipes at constant hoop stress, necessitating pressure adjustments. From the results, the Andrade creep constants considered to represent two different types of creep flow were determined. Some consideration is given to the nature of creep flow, and a hypothesis is developed to account for the results. Applications to some problems connected with the use of lead sheath for high-voltage pressure cables. 32 ref.

9c-3. Uber den Schlagbiege—und Kerbschlagversuch an Zinklegierungen. (Impact Bending and Notched-Bar Impact Testing of Zinc Alloys.) Nikolaus Ludwig. *Metallforschung,* v. 1, Oct.-Nov. 1946. p. 150-158.

Results of tests made on a series of Zn alloys at −40 to −80° C. Different types of impact bars are illustrated and a new standard impact bar is proposed. 29 ref.

9c-4. Correlation of Structure and Properties of 85-5-5-5 Alloy Test Bars. J. G. Kura and L. W. Eastwood. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 575-598; discussion, p. 598-601.

Results of use of microradiographic techniques for study of six different test-bar designs. Effects of gas content of the melt, pouring temperature, and manner of feeding. The three main structural features which determine tensile properties were found to be: quantity and distribution of microporosity; size, shape, and distribution of lead particles; and occurrence of localized shrinkage. See also item 9-99, 1947.

9d—Light Metals

9d-1. Aluminum and Its Applications. Hiram Brown. *Light Metal Age,* v. 5, Dec. 1947, p. 13-20.

Chapter 2 of forthcoming book deals with testing methods and definitions of terms used in testing. 16 ref.

9d-2. Dependence of the Heat Resistance of Aluminum Alloys on Their Composition and Structure. (In Russian.) A. A. Bochvar. *Izvestiya Akademii Nauk SSSR Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Oct. 1947, p. 1369-1384.

A rapid auxiliary method for high-temperature performance determination is proposed, based on the gradual change, with time of loading, of the size of impressions obtained by forcing a macro or micro-indenter under constant load into the specimen. On the basis of data obtained by the above method and also by standard creep testing, it is believed that the heat resistance of alloys results from heterogeneity of their crystal structures, and also may be caused by the formation of screen or skeleton-like inclusions of solid phases on the grain boundaries.

9d-3. A Fluidity Test for Aluminum Casting Alloys. W. E. Sicha and R. C. Boehm. *American Foundrymen's Association, Preprint* No. 48-34, 1948, 5 pages.

Details of a standardized procedure for measuring relative fluidity or mold-filling capacity of different lots of the same Al alloy.

9d-4. The Development of a Permanent Mold for Aluminum Tensile Test Bars. L. J. Ebert, R. E. Spear, and G. Sachs. *American Foundrymen's Association Preprint* No. 48-13, 1948, 16 pages.

A mold for the above with a short-time operating cycle. The two-bar mold cavity was designed so that sound castings can be obtained with the pouring of a small amount of metal, and with a minimum of trimming. Factors which influence mold operation and test-bar properties were examined by the casting of five different Al alloys.

9d-5. Crushing Strength of Aluminum Tubes. E. Creutz. *U. S. Atomic Energy Commission,* MDDC-1448, Sept. 17, 1943, 6 pages.

Method of measuring on a series of 2 S, cold-drawn tubes. Equations are given for long tubes to which hydrostatic pressure is applied externally.

9d-6. The Testing of Light Alloy Fusion Welds. *Welding Research,* (Bound with *Transactions of the Institute of Welding,* v. 11), June 1948, p. 54r-60r.

Some features of a light-alloy weld that affect its behavior in testing; tests used in determining the quality of light-alloy welds; selection of test pieces; visual, metallographic, and radiographic examination; hardness testing; tensile tests; and bend tests.

9d-7. Testing and Control of Spot Welds in Aluminum. Gerard H. Boss. *Metal Progress,* v. 54, Sept. 1948, p. 344, 345-347.

Third portion of a survey of wartime developments in the spot welding of aluminum alloys is limited to a discussion of the static testing of simple test specimens.

9d-8. Bearing Strengths of Some Aluminum-Alloy Sand Castings. R. L. Moore. *National Advisory Committee for Aeronautics. Technical Note* No. 1523, Aug. 1948, 19 pages.

Results of tests of four types of the aluminum alloys. Comparisons between tensile properties obtained from individually cast test bars and specimens machined from the bearing-test slabs emphasize the fact that size and form of casting may have a significant effect upon mechanical properties. Ratios of bearing to tensile strengths are proposed as a basis for design.

9d-9. Creep Test Machine for Light Alloys. (In Russian.) K. I. Portnoi and A. V. Rudnev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 985-990.

For long and short-time creep tests at temperatures from 350 to 400° C. This machine is characterized by its simplicity, compactness, and ease of production in industrial shops. Details of construction and examples of tests performed, with corresponding diagrams.

9d-10. The Determination of Elongation of Sand-Cast Light Alloy Test Bars. F. M. Howell. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 187-192.

9d-11. La microdurezza Hanemann nelle leghe di alluminio. (Hanemann's Method for Determination of the Microhardness of Aluminum Alloys.) Vincenzo Montoro and Renzo Parigi. *La Metallurgia Italiana,* v. 39, Sept.-Oct. 1947, p. 206-212.

Critically analyzes above German method, which is a modified Vickers method. Factors affecting its accuracy.

SECTION X

ANALYSIS

10a—General

10a-1. Some Applications of Inorganic Chromatography. G. Robinson. *Metallurgia,* v. 37, Nov. 1947, p. 45-47.

Some qualitative and quantitative applications of chromotography, with suggestions for further methods of application to the microanalysis of alloys. Use of 8-hydroxyquinoline as an adsorbent for Cu, Ni, and Zn. (To be continued.)

10a-2. Effect of Manganese on the Short Iodide Method for Copper. E. T. Pinkney, R. Dick, and R. S. Young. *Journal of the Society of Chemical Industry,* v. 66, Oct. 1947, p. 342.

An explanation is advanced for the inability of some laboratories to secure satisfactory results in the presence of manganese. Precautions necessary to eliminate interference in this ore-analysis method.

10a-3. Salinogenic or Chelate Forming Dyes as Analytical Reagents. A. Steigmann. *Journal of the Society of Chemical Industry,* v. 66, Oct. 1947, p. 353-355.

The diazoamino group was found to be Ag, Hg and Cd selective. The sulphonamide group present in sulphanilamide and other alpha drugs is similarly reactive. Para diethylaminobenzeneazo chromotropic acid was found to be Ce, Ca, Mg and (under certain conditions) Cu, Ni, and Co selective. 5-(p-nitrobenzeneazo)-7-nitroso-8-hydroxyquinoline (oxin violet) is copper specific and nickel selective. New reactions of nitroso-R-acid; photographic reactions.

10a-4. New Analytical Reactions With Anionic and Cationic Wetting Agents. A. Steigmann. *Journal of the Society of Chemical Industry,* v. 66, Oct. 1947, p. 355-356.

The orthosilicates and metaphosphates of cetyltrimethyl-ammonium bromide ("Cetavlon") or of "Sapamine KW 200%" absorb acid dyes and acid spot-test reagents and therefore provide analytical "trace catchers". Cetavlon also precipitates the anionic complexes of Hg, Au, and Pt from slightly acid or neutral solutions of the metal chlorides. Spot-test papers with Sapamine iodide are very selective for Pt and Pd and more sensitive than those with 2-thiobenziminazole. The oxidation of aromatic amines is greatly influenced by anionic wetting agents.

10a-5. Trends in Quantitative Analysis; A Survey of Papers for the Year 1946. Frederick C. Strong. *Analytical Chemistry,* v. 19, Dec. 1947, p. 968-971.

All research papers published in 1946 and covered in *Chemical Abstracts* prior to September 1947 were studied. The largest number of papers was on volumetric analysis but the number on colorimetry was almost as great; 56% of all papers were on instrumental methods of analysis.

10a-6. Flame Excitation Methods for Quantitative Spectrochemical Analysis. H. C. T. Stace. *British Chemical Digest,* v. 2, Dec. 1947, p. 75-78. Condensed from *Australian Chemical Institute Journal and Proceedings,* v. 14, April 1947.

Scope of the methods indicated by a periodic chart with those elements detectable by flame excitation appearing in two blocked-off areas. The solution and solid techniques. 14 ref.

10a-7. Determination of pH at the Beginning of Precipitation of Columbium and Titanium Hydroxides. (In Russian.) N. G. Klimenko and V. S. Syrokomskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1029-1034.

The above pH depends upon the initial concentration of Cb. The range for pentavalent Cb at concentrations between 0.003 and 0.013 gram-atoms per liter was established, as well as that for trivalent Cb and also the effect of variations in temperature up to the boiling point of the solutions. 17 ref.

10a-8. Determination of Columbium in the Presence of Titanium. (In Russian.) V. S. Syrokomskii and N. G. Klimenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1035-1037.

Method based on differential hy-

drolysis. Effects of different precipitants and of variations in pH. The method is claimed to be superior in speed and equal in accuracy to other methods for analysis of a variety of ores and metals.

10a-9. Rapid Method for Determination of Iron and Titanium Dioxide in Vanadium Slags. (In Russian.) B. Ia. Barkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1133-1136.

Iron is determined by potentiometric titration using potassium dichromate. Titanium is determined by titration with iron chloride and with ammonium thiocyanate as indicator.

10a-10. A.E.S. Research Project No. 2; Determination of Impurities in Electroplating Solutions. VII. Traces of Silica in Nickel-Plating Baths. Earl J. Serfass, W. S. Levine, and P. J. Prang. *Plating,* v. 35, Feb. 1948, p. 156-160, 196.

No references were found in the literature to methods for the above analysis, specifically. However, there are hundreds of reports of silica determination in other materials. Based on these, a precise gravimetric and an approximate colorimetric method were developed. 27 ref.

10a-11. Titration of Iron in High-Temperature Alloys. Louis Silverman. *Steel,* v. 122, Jan. 26, 1948, p. 66, 68.

Details of copper-powder reduction method for determination of iron in the presence of such elements as Ni, Co, Cr, W, Si, Mn, and Al.

10a-12. Some Applications of Inorganic Chromatography. (Concluded). G. Robinson. *Metallurgia,* v. 37, Dec. 1947, p. 107-108.

Miscellaneous reagents; two-dimensional methods; inorganic partition chromatography. 10 ref.

10a-13. Simple Field Test for Distinguishing Minerals by Abrasion pH. Rollin E. Stevens and Maxwell K. Carron. *American Mineralogist,* v. 33, Jan.-Feb. 1948, p. 31-49.

Simple test using the pH of suspensions made by grinding in water. The term abrasion pH is proposed to designate pH values obtained by this technique, which may differ from pH values obtained by shaking previously ground minerals in water. Abrasion pH values are given for about 280 mineral species, many of them confirmed repeatedly by determinations on specimens from different localities.

10a-14. Zinc Determination; Absorptiometric Methods in Bright-Nickel Plating Solutions. D. F. Phillips and L. J. Holton. *Metal Industry,* v. 72, Jan. 23, 1948, p. 69-70.

Development of a rapid and precise method for determining amounts of zinc from 0 to 200 pieces per minute.

10a-15. Electrometric Noncompensating Method for Determination of Nickel and Copper in Ores. (In Russian.) S. K. Chirkov. *Zavodskaya Laboratoriya* (Factory Laboratory), Oct. 1947, p. 1158-1162.

Ni and Cu are titrated successively using a KCN solution in ammonia in the presence of NH_4Cl using the electrode pair Pt-Ag. Includes titration curves.

10a-16. Polarographic Method for Control of Electrolytic Bath Compositions. III. (In Russian.) D. A. Vyakhirev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1167-1171.

Use of stationary Pb electrodes instead of Hg for the amperometric titration of sulphate solutions, especially nickel-plating baths. 11 ref.

10a-17. Use of Polarographic Method in Analysis of Zinc-Plating Baths. (In Russian). I. A. Korshunov and L. N. Sazanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1172-1173.

The polarographic techniques for determination of Zn, Al, Cu, Fe, Pb, and other substances which are present is described and results are compared with those obtained gravimetrically.

10a-18. Alternating-Current Arc With Electron Tube Control for Spectrographic Analysis. (In Russian). N. F. Vollerner. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1215-1217.

Circuit details. The installation results in greater arc stability and greater ease of adjustment.

10a-19. Rapid Method for Determination of Calcium in Slags. (In Russian.) P. Ya. Yakovlev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1253.

Method described is based on precipitation of Ca in the form of oxalate in NH_3 medium, followed by volumetric determination of the unreacted oxalic acid.

10a-20. Rapid Method for Determination of Manganese in Ores. (In Russian). N. S. Tkachenko and S. M. Khripach. *Zavodskaya Laboritoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1254-1255.

Method based on back titration of excess $KMnO_4$ by bivalent Mn.

10a-21. Rapid Determination of Copper in a Nickel Electrolyte. (In Russian.) V. V. Drozdov, E. S. Kozich, and A. L. Rotinyan. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1256.

Compares volumetric methods—one direct and other indirect.

10a-22. The Determination of the Oxygen Content of Metals by the Carbon Monoxide Method. D. Lipkin and M. L. Perlman. *U.S. Atomic Energy Commission,* MDDC-294; LADC-142, Feb. 3, 1944, 15 pages.

Technique and apparatus using vacuum fusion in graphite and analysis of the gases evolved.

10a-23. A New Method for the Direct Precipitation of Aluminum in the Presence of Iron. (In English.) H. N. Wilson. *Analytica Chimica Acta,* v. 1, Nov. 1947, p. 330-336.

Aluminum can be precipitated as benzoate from solutions containing up to 1 g. of iron in the presence of thioglycollic acid, which reduces the iron and forms a soluble complex with ferrous iron. Very large amounts of such salts as ammonium chloride, sulphate, and perchlorate, and sodium chloride, do not interfere, nor do other divalent metals. Molybdates and tungstates are without effect, but chromium, vanadium and titanium interfere.

10a-24. Perfectionnement a la Methode d'Analyse des Oxydes Metalliques par Réduction Electrolytique. (Improvement of the Method of Analysis of Metallic Oxides by Electrolytic Reduction.) Jean Besson. *Comptes Rendus* (France), v. 225, Dec. 10, 1947, p. 1154-1156.

Electrolytic reduction of a given amount of thallium peroxide was performed at decreasing current densities. From corresponding curves, the limiting value for zero intensity was determined. The method is applicable to other metallic oxides.

10a-25. How to Separate Alloys by Spot Testing. H. Kirtchik. *Steel,* v. 122, Feb. 23, 1948, p. 91, 106.

Use of nonspecific reagents is shown to be a quick method of determining presence of certain elements in both ferrous and nonferrous alloys.

10a-26. Colorimetric Determination of Iron With 4-Hydroxybiphenyl-3-Carboxylic Acid. John H. Yoe and Aubrey E. Harvey, Jr. *Journal of the American Chemical Society,* v. 70, Feb. 1948, p. 648-654.

Use of 4-hydroxybiphenyl-3-carboxylic acid as an agent for detection of traces as small as 1 in 40 million. Ti does not interfere. Data for a large number of other cations show only a few cases of interference. Quantitative range is 0.2-1.0 p.p.m. Data for determinations in feldspar, glass sand, dolomite, silica brick, glass, and sheet brass illustrate applicability and accuracy. 35 ref.

10a-27. Thorium in Monazite Sand; Separation and Determination by Precipitation From Homogeneous Solution. Hobart H. Willard and Louis Gordon. *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 165-169.

New method claimed to be more accurate and rapid than those previously described. 22 ref.

10a-28. Mercury Cathode Cell for Rapid Electrolysis. F. T. Rabbitts. *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 181-182.

Improved apparatus which is said to be more adaptable to control and research work and to require much less time for electrolysis in analysis of metals and ores. 10 ref.

10a-29. The Determination of Sulphate as Barium Sulphate. William H. Millett and Wallace M. McNabb. *Journal of the Franklin Institute,* v. 243, March 1947, p. 205-217.

A comparison was made of results obtained after the removal of the above metals with those which were obtained by direct precipitation in the presence of the metallic ions. The metals considered were cadmium, mercury, bismuth, copper, antimony, arsenic and tin. 10 ref.

10a-30. Méthode Pratique de Dosage Amperométrique du Manganese. (Practical Method for Amperometric Determination of Manganese.) G. Goffart, G. Michel, and Th. Pitance. *Analytica Chimica Acta,* v. 1, Dec. 1947, p. 393-407.

The manganous ion is oxidized quantitatively into the manganic by titration with permanganate in approximately neutral pyrophosphate solution. The end point is obtained electrometrically. There is practically no foreign-ion interference.

10a-31. Simultaneous Photography of Two Wave-Length Ranges in Spectrochemical Analysis. N. H. Nachtrieb and others. *Analytical Chemistry,* v. 20, March 1948, p. 282.

Modification of an A.R.L.-Dietert spectrograph so as to direct light from one arc or spark source upon two of the slits at one time, which is useful in analysis of certain materials in which the important lines are widely separated.

10a-32. Experience With Photometric Procedures for the Determination of

Metals. H. Cox. *Metallurgia,* v. 37, March 1948, p. 270-274.

Various problems associated with the use of photometric procedures and suggested improvements. A method for the determination of Cr in steel eliminating the use of silver nitrate as a catalyst, and a composite method for determinations of Cr, Mo, Fe in welding fluxes. 18 ref.

10a-33. 45-Second Spectrochemical Analysis of Metals Possible by Direct-Reading Method. *Steel,* v. 122, April 12, 1948, p. 109, 112, 114.

The "Quantometer", an instrument by which up to 11 elements can be analyzed simultaneously.

10a-34. Les Méthodes Spectrographiques d'Analyses Appliquées au Controle des Alliages de Fonderie. (Spectrographic Methods of Analysis Applied to the Control of Alloys in the Foundry.) Paul Croisant. *Fonderie,* Dec. 1947, p. 995-998.

10a-35. The Determination of Oxidized Zinc in Ores and Concentrator Products. C. W. Barker and R. S. Young. *Journal of the Society of Chemical Industry,* v. 67, Feb. 1948, p. 61.

Satisfactory procedure depending on the selective solubility of minerals in a dilute H_2SO_4 solution saturated with SO_2.

10a-36. A Review of Electrolytic Methods of Microchemical Analysis. A. J. Lindsey. *Analyst,* v. 73, Feb. 1948, p. 67-73; discussion, p. 74.

10a-37. Systematic Analysis of Cations by a Polarographic Method. Part I. Conditions for Determination of the Copper and Iron Subgroups. (In Russian.) M. A. Portnov and A. A. Kozlova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 2, Nov.-Dec. 1947, p. 345-352.

A study of the influence of different factors on the reduction potential and the intensity of the polarographic waves of Cu, Bi, Cd, Pb, Fe, Cr, and Al. 21 ref.

10a-38. Constitution of the Phosphate-Vanadate-Molybdate Complex Produced During Colorimetric Determination of Phosphorus by Mission's Method. (In Russian.) N. V. Maksimova and M. T. Kozlovskii. *Zhurnal Analyticheskoi Khimii* (Journal of Analytical Chemistry), v. 2, Nov.-Dec. 1947, p. 353-358.

A formula for the complex compound was established. Possibility of a gravimetric or volumetric determination of P in the presence of large amounts of V by o-hydroxyquinoline percipitation of the complex. 13 ref.

10a-39. Investigation of Slightly Soluble Metavanadates From the Point of View of Their Relative Solubilities. (In Russian.) V. L. Zolotavin. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 2, Nov.-Dec. 1947, p. 364-372.

Relative solubilities of a series. Methods for separation of iron ions from vanadate ions in the presence of mercurous salts and for separation of mercurous, iron, silver, and copper ions, in the form of their vanadates, from other cations. The superiority of mercurous vanadate for gravimetric determination of vanadium.

10a-40. Report of Committee E-3 on Chemical Analysis of Metals. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 431-434.

10a-41. Die Komplexometrische Titration der Erdalkalien und Einiger Anderer Metalle mit Eriochromschwarz T. ("Complexometric"—Titration of Alkaline-Earth and Several Other Metals Using Eriochrome Black T.) W. Biedermann and G. Schwarzenbach. *Chimia,* v. 2, March 15, 1948, p. 56-59.

Potentiometric titration method for determination of Mg, Ca, Sr, Zn, Cd, Pb, Mn, and Hg, using "Eriochrome Black T" as an indicator.

10a-42. Ford's Lab-On-Wheels Makes Analyses on the Spot. *SAE Journal,* v. 56. April 1948, p. 59-62. Based on "The Control of Materials by a Motorized Laboratory", by Henry A. Tuttle and George A. Nahstoll.

Mobile laboratory that travels to various parts of the 1200-acre Rouge plant to make chemical and physical tests of metals in storage of scrap, and of work in process.

10a-43. Bibliography of Publications Dealing With the Polarographic Method in 1946. (In English.) J. Heyrovsky and O. H. Muller. *Collection of Czechoslovak Chemical Communications,* v. 12, Nov.-Dec. 1947, p. 677-685.

141 references.

10a-44. Komplexone. VII. Titration von Metallen mit Nitrilotriessigsäure, H_3X. Endpunktsindikation durch pH-Effekte. VIII. Titration von Metallen mit Urammildiessigsäure, H_3Z. Endpunktsindikation durch pH-Effekte. IX. Titration von Metallen mit Athylendiamin-tetraessigsäure, H_4Y. Endpunktsindikation durch pH-Effekte. (Complex Compounds. Part VII. Titration of Metallic Ions Using Triacetic Acid Nitrile, H_3X. Indication of End-Point by pH Effect. Part VIII. Titration of Metallic Ions Using Uranyldiacetic Acid, H_3Z. Indication of End-Point by pH Effect. Part IX. Titration of Metallic Ions Using Ethylenediamine

Tetraacetic Acid, H_4Y. Indication of End-Point by pH Effect.) G. Schwarzenbach and W. Biedermann. *Helvetica Chimica Acta,* v. 31, March 15, 1948, p. 331-340, 456-465.

Results using above methods for determination of a long series of metallic ions. Nature of the complex ions formed.

10a-45. Take Guesswork Out of Metal Identification. George Black. *Products Finishing,* v. 12, May 1948, p. 30, 32, 34, 36, 38.

Simplified methods for distinguishing aluminum from magnesium, bare from clad aluminum sheet, and corrosion resistant from carbon steel.

10a-46. Determination of Impurities in Electroplating Solutions. VII. Traces of Cadmium in Nickel Plating Baths. Earl J. Serfass, W. S. Levine, G. Frederick Smith and Frederick Duke. *Plating,* v. 35, May 1948, p. 458-462.

Following a literature survey which proved fruitless, the authors developed a satisfactory procedure which is described in detail. After removal of Cu and Fe and separation of Cd from Ni, the Cd is determined colorimetrically.

10a-47. "Electrochronometric" Method of Analysis. Part I. (In Russian.) F. I. Trishin. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, Jan.-Feb. 1948, p. 21-28.

New general method in which the amount of the substance being determined is proportional to the time which elapses before a sudden increase in the potential of ionic solutions during potentiometric titration using a mercury cathode.

10a-48. Description of Automatic Recording Apparatus for Qualitative and Quantitative Determination of Ions on the Basis of Their Potential and Time Required for Their Separation at Constant Current Density. (Type I.) (In Russian.) F. I. Trishin. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, Jan.-Feb. 1948, p. 29-30.

10a-49. 1,2-Cyclohexanedione Dioxime; A Reagent for Nickel. Roger C. Voter, Charles V. Banks, and Harvey Diehl. *Analytical Chemistry,* v. 20, May 1948, p. 458-460.

One part of Ni in 10,000,000 may be detected with the reagent. Precipitation is complete at pH values of 3 and greater, and may be made from solutions of various anions. Separates Ni from Zn, Be, U, Al, the alkali and alkaline earth metals, Mn, Cd, Sb, and As. Attempts to separate Ni from Fe failed. 11 ref.

10a-50. The Effect of Variations in the General Composition of Samples in Spectrographic Analysis. G. O. Langstroth and D. Andrychuk. *Canadian Journal of Research,* v. 26, sec. A, March 1948, 39-49.

Variations that occur in intensity ratios belonging to pairs of elements on the addition of various extraneous substances to standard samples were studied using a common type of condensed spark discharge. The variations bore no apparent relation to relative ionization potentials or atomic weights of the test elements, nor to any physical property of the added substances.

10a-51. Percentages of Alloying Components in Metals Determined by Geiger Counter Type Unit. *Steel,* v. 122, June 7, 1948, p. 108.

New X-ray diffraction technique using a Geiger-counter-type fluorescence analysis unit.

10a-52. Spectrochemical Analysis: I. The Copper Spark Method. M. C. Bachelder, J. G. Conway, N. H. Hachtrieb, and A. B. S. Wildi. *U. S. Atomic Energy Commission,* MDDC-511, Dec. 12, 1946, 14 pages.

A method of extraordinary sensitivity is described for the determination of 30 elements. The method may be applied to the direct determination of impurities in solution, but finds particular application in cases wherein chemical separation of the impurities precedes their determination.

10a-53. Polarographic Behavior of Ions Using Sodium Fluoride as Supporting Electrolyte. (In English.) Philip W. West, James Dean, and Ernest J. Breda. *Collection of Czechoslovak Chemical Communications,* v. 13, Jan.-Feb. 1948, p. 1-10.

Study undertaken to determine the behavior since NaF is a relatively well-known complex former.

10a-54. Spectrochemical Analysis. F. Twyman. *Research,* v. 1, June 1948, p. 388-393.

Types of spectrochemical analysis and their applicabilities to both metals and nonmetals. 18 ref.

10a-55. Analyses by the Pile. *Industrial and Engineering Chemistry,* v. 40, July 1948, 10A, 12A, 16A.

New technique being developed by which atomic radiation can be used to quantitatively determine elements present in amounts of only a few parts per million.

10a-56. Relative Transition Probabilities in the Spectra of Ti I and Ti II. (In English.) L. H. M. Van Stekelenburg and J. A. Smit. *Physica,* v. 14, May 1948, p. 189-196.

The above probabilities for several lines in the two spectra were measured in emission and were compared with the results obtained by King and King who measured the oscillator strength by an absorption method. 10 ref.

10a-57. The Zeeman Effect in the First Selenium Spark Spectrum. (In English.) J. C. Van Den Bosch. *Physica,* v. 14, May 1948, p. 249-259.

The magnetic separation of several lines of the selenium spark spectrum. 18 ref.

10a-58. Develop Chemical Methods for Faster Sand Analysis. R. A. Willey and J. B. Caine. *American Foundryman,* v. 14, July 1948, p. 50-56.

Rapid but accurate methods for loss on ignition, carbon, iron oxide, calcium oxide, sodium oxide, potassium oxide, silica, alumina, and magnesia. Sampling procedure.

10a-59. Automatic Gravimetric Analysis. (Using the Gooch Crucible.) (In French.) Clement Duval. *Comptes Rendus,* (France), v. 226, April 19, 1948, p. 1276-1278.

Further details on a method previously described (v. 224, 1947, p. 1824) in which the loss of weight of the precipitate in a Gooch crucible is followed and recorded by a Chevenard microbalance. Advantages in accuracy and speed. Drying temperatures for various precipitates obtained in analysis of Ag, Ba, Ca, Cs, K, La, Mg, Na, Rb, and Tl.

10a-60. L'Analyse spectrographique dans la metallurgie. (Spectrographic Analysis in Metallurgy.) Joseph Orsag. *Revue de L'Aluminium,* v. 25, May 1948, p. 151-159.

Principles, procedures, and applications.

10a-61. Quinquevalent Molybdenum as a Volumetric Reagent. Part I. Stability of Solutions and Determination of Ferric Iron. Part II. The Titration of Iodate, Bromate, Dichromate and Vanadate. Part III. The Determination of Ceric, Ferric, Dichromate and Vanadate Solutions in Mixtures of Two and Three Together. A. R. Tourky, M. Y. Farah, and H. K. El Shamy. *Analyst,* v. 73, May 1948, p. 258-268.

Experimental potentiometric titration curves. Factors involved. 13 ref.

10a-62. Weighing Spots Impurity. *Science News Letter,* v. 54, Aug. 7, 1948, p. 87.

An electronic device capable of speeding up detection of impurities in metals from a matter of days by chemical methods to 5 to 15 min.

10a-63. Polarographische Kupfer-, Zink- und Manganbestimmung in Aluminium- und Zinklegierungen. (Polarographic Method of Determining Copper, Zinc, and Manganese in Aluminum and Zinc Alloys.) M. Spalenka. *Zeitschrift fur Analytische Chemie,* v. 128, no. 1, 1947, p. 42-51.

A new, rapid and direct method. Results of method. 10 ref.

10a-64. L'etat actuel de la polarographie. Une revue bibliographique des annees 1941-1947. (Present Status of Polarography. A Review of the Literature for the Years 1941-1947.) Paul Delahay. *Analytica Chimica Acta,* v. 2, Feb. 1948, p. 60-73.

241 references.

10a-65. Titrimétrie des ions céreux par le permanganate. (Titrimetric Determination of Cerous Ions by Permanganate.) G. Goffart. *Analytica Chimica Acta,* v. 2, April 1948, p. 140-145.

Direct titration method for the above in nearly neutral pyrophosphate solution. The reaction was studied both potentiometrically and amperometrically. The latter method yields the best results and permits use of a particularly simple and practical device. The only interfering element is manganese.

10a-66. Correction for Gamma Changes Due to Variations in Exposure and Development With Reference to Spectrographic Analysis. (Two Line-Pair Method.) C. Sanders. *Journal of the Society of Chemical Industry,* v. 67, May 1948, p. 185-187.

The procedure was found useful in the spectrographic determination of composition by the method in which the log ratio of deflection is plotted against per cent content (or log per cent content), no intensity calibration being carried out. Essentially the procedure consists of using two line pairs for each determination, one on the positive and the other on the negative side of log ratio 0.000.

10a-67. A New Method of Photographic Evaluation of Spectrographic Analysis. A. Argyle and W. John Price. *Journal of the Society of Chemical Industry,* v. 67, May 1948, p. 187-190.

A simple nomographical method for evaluation of minor constituents, which, provided that the density values all fall on the straight line portion of the H. & D. curve of the emulsion used, is independent of gamma variation. The nomograph not only corrects for changes in gamma across one plate, but also from plate to plate of any type.

10a-68. Une nouvelle technique de microdosage iodométrique du fer. (A

New Technique for Iodometric Microdetermination of Iron.) L. Deibner. *Bulletin de la Société Chimique de France,* May-June 1948, p. 615-629.

Extensive details of a micro modification of the Mohr-Braun method, including a review of the literature on iodometric determination of iron. Effects of various factors on the accuracy of the determination. 40 ref.

10a-69. Quelques dosages semiquantitatifs basés sur l'emploi de réactifs sensibles et sélectifs. (Some Semiquantitative Determinations Based on the Use of Sensitive and Selective Reagents.) Paul E. Wenger and D. Monnier. *Bulletin de la Société Chimique de France,* May-June 1948, p. 517-520.

General analytical method. Three or four reagents which are selective for the element being considered are chosen and their limits of detection are determined. Tables and formulas are then prepared which permit calculation or estimation of the approximate amount of the element present from observation of several factors. The method is illustrated by several examples including analysis of copper, chromium, and nickel in alloys.

10a-70. Erreur résultant de l'usage d'un condensateur d' amortissement lors des enregistrements polarographiques. (Error Resulting From the Use of a Damping Condenser During Polarographic Recording.) Paul Delahay. *Bulletin de la Société Chimique de France,* May-June 1948, p. 527-528.

There is an error of the order of 0.005 to 0.010 volt in the half-wave potential under the above conditions.

10a-71. Application of Methylviolet in Quantitative Analysis. Determination of Cadmium. (In Russian.) M. A. Popov. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry) v. 3, May-June, 1948, p. 167-171.

Method applicable to separation of Cd from the principal minerals in which it is found. The Cd is determined colorimetrically in the form of the sulphate. The method permits determination of 0.5% Cd in a 5g. sample, and is said to be adapted to routine analysis. 11 ref.

10a-72. The Flame Photometer. R. Bowling Barnes, John W. Berry, and Wilbur B. Hill. *Engineering and Mining Journal,* v. 149, Sept. 1948, p. 92-94.

Apparatus and its use for instantaneous and continuous assay of ore-dressing mill pulps.

10a-73. Reaction of Ferrous and Ferric Iron With 1, 10-Phenanthroline. I. Dissociation Constants of Ferrous and Ferric Phenanthroline. T. S. Lee, I. M. Kolthoff, and D. L. Leussing. *Journal of the American Chemical Society,* v. 70, July 1948, p. 2348-2352.

Above reaction is used extensively for the colorimetric determination of iron and as an oxidation-reduction indicator. Results of a study of dissociation constants and of the effects of acid on them. 10 ref.

10a-74. Nouveau dosage volumétique du cuivre au moyen du dichromate. (New Volumetric Method for Determination of Copper in a Thiocyanate Medium.) F. Burriel Marti and F. Lucena Conde. *Analytica Chimica Acta,* v. 2, July 1948, p. 230-240.

Method is based on reaction of cuprous thiocyanate with ferric sulfate. Very satisfactory results were obtained. 14 ref.

10a-75. The Quantometer, A Direct Reading Instrument for Spectrochemical Analysis. M. F. Hasler, R. W. Lindhurst, and J. W. Kemp. *Journal of the Optical Society of America,* v. 38, Sept. 1948, p. 789-799.

Instrument equipped with movable receivers, from the standpoints of basic optical, mechanical, and electrical design. Basic electrical circuits and constants are given in detail.

10a-76. The Polarograph as an Analytical Tool in Industry. Martha J. Bergin. *Instruments,* v. 21, Sept. 1948, p. 828-830.

Principles, sensitivity and accuracy, scope, and applications.

10a-77. Automatic Potentiometric Titration of Iron and Titanium With Chromous Ion. James J. Lingane. *Analytical Chemistry,* v. 20, Sept. 1948, p. 797-801.

Automatic titration of ferric ion in sulphuric acid with a platinum indicator electrode is precise and accurate to $\pm 0.1\%$. Titration of Ti(IV) is precise and accurate to about $\pm 0.2\%$. Titration curves demonstrate the erroneous behavior of a platinum indicator electrode in solutions whose oxidation potential is below that of the hydrogen-hydrogen ion couple. A mercury indicator electrode is used for the titanium titration. 10 ref.

10a-78. Recent Progress in Instrumental Analysis. David F. Boltz. *Record of Chemical Progress,* v. 9, Summer 1948, p. 45-55.

A survey. 32 ref.

10a-79. The Application of Solid Electrodes in Polarography. III. (In Russian.) E. M. Skovets, P. P. Turov, and V. D. Ryabakon. *Zavodskaya Labora*

toriya (Factory Laboratory), v. 14, July 1948, p. 772-777.

A comparative investigation of polarograms obtained using both stationary and rotating solid electrodes in an automatic recording apparatus. It was found that the most convenient solid electrodes are those operating at maximum current. 6 ref.

10a-80. Accuracy and Reproducibility of Results of Determination of Small Quantities of Molybdenum. (In Russian.) M. A. Popov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 874.

Presents further data for a method described in v. 14, July 1947, p. 895.

10a-81. Colorimetric Determination of Cerium. (In Russian.) D. I. Rybchikov and Z. G. Strelkova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, July-Aug. 1948, p. 226-231.

The possibility of the above. A stable colored solution of quadrivalent Ce is obtained if the ion of the metal is present in the form of a complex compound with citric acid. Transformation of trivalent Ce into the quadrivalent form is obtained by the action of H_2O_2 in an alkaline medium.

10a-82. Arsenate Method for Iodometric Determination of Copper. (In Russian.) G. B. Shakhtakhtinskii and T. D. Efendiev. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, July-Aug. 1948, p. 245-249.

New method, said to give much greater accuracy than the one commonly used.

10a-83. Determination of Copper by Means of o-Phenylenediamine. (In Russian.) N. I. Tarasevich. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, July-Aug. 1948, p. 253-257.

Results were unsatisfactory. Possibility of use in determination of other metals is being investigated.

10a-84. A Spectrophotometric Study of the Reaction of Ferric Iron and Citric Acid. Oscar E. Lanford and James R. Quinan. *Journal of the American Chemical Society,* v. 70, Sept. 1948, p. 2900-2903.

Results of study of reaction, which is often used in analytical chemistry. 14 ref.

10a-85. Electrodeposition Principles in Analysis; Classical Methods and Modern Trends. *Chemical Age*, v. 59, Sept. 18, 1948, p. 386-389.

10a-86. Determination of Impurities in Electroplating Solutions. X. Traces of Aluminum in Nickel Plating Baths. Earl J. Serfass, W. S. Levine, G. Frederick Smith, and Frederick Duke. *Plating,* v. 35, Oct. 1948, p. 1019-1022, 1054.

A method is proposed, using the standard colorimetric procedure with aluminon reagent, after removal of interfering metals. 16 ref.

10a-87. Rapid Method for Determination of Sulfide Sulfur. (In Russian.) Yu. A. Chernikhov and R. F. Makarova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 649-653.

Combustion method. Optimum conditions are indicated and illustrated by application to ore analysis.

10a-88. Persulfate Method for Manganese Determination in Agglomerates and Iron Ores. (In Russian.) Yu. I. Usatenko and P. A. Bulakhova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 751-752.

The method, which is commonly used for analysis of steel and iron, was modified.

10a-89. Bibliography of Publications Dealing with the Polarographic Method in 1947. (In English.) J. Heyrovsky and O. H. Muller. *Collection of Czechoslovak Chemical Communications,* v. 13, July-Sept. 1948, p. 481-491.

Presents 185 references, including 17 from earlier years, omitted inadvertently from previous bibliographies by the authors.

10a-90. Basic Aspects of X-Ray Absorption in Quantitative Diffraction Analysis of Powder Mixtures. Leroy Alexander and Harold P. Klug. *Analytical Chemistry,* v. 20, Oct. 1948, p. 886-889.

Pertinent mathematical relationships are developed which relate the diffracted intensity to the absorptive properties of the sample. 12 ref.

10a-91. Polarography; Some Factors Affecting Drop Time. F. L. English. *Analytical Chemistry,* v. 20, Oct. 1948, p. 889-891.

The influence of capillary vibration, applied voltage, magnitude of current flowing through the cell, capillary active agents, purity of mercury (including certain amalgams), and stray currents in the constant-temperature bath. 11 ref.

10a-92. Polarographic Determination of Iron. Louis Meites. *Analytical Chemistry,* v. 20, Oct. 1948, p. 895-897.

Iron can be determined polarographically by measuring the height of the anodic wave of ferrous iron in a slightly acidic oxalate supporting electrolyte. Two methods for

preparation of the solution. With small percentages of iron, the method is capable of much greater accuracy than volumetric or gravimetric procedures. 24 ref.

10a-93. Photometric Determination of Arsenic in Copper and Copper-Base Alloys. O. P. Case. *Analytical Chemistry,* v. 20, Oct. 1948, p. 902-904.

Method is applicable to the determination of arsenic in arsenical brass, arsenical copper, fire-refined copper, lead and tin-base bearing metals, and openhearth iron. It is somewhat more rapid than conventional distillation-volumetric procedures, and it allows the use of smaller samples and gives a better recovery of arsenic. 13 ref.

10a-94. Determination of Iron and Manganese. *Chemical Age,* v. 59, Oct. 2, 1948, p. 459.

Recent findings of Russian chemists.

10a-95. A Rapid Method of Spectrographic Analysis. H. R. Clayton. *Journal of the Society of Chemical Industry,* v. 67, July 1948, p. 270-273.

Process developed to enable spectrographic analysis to be carried out in approximately 10 min. Speed has been attained chiefly through attention to methods of processing the photographic plates, which are developed and fixed in ultra-rapid reagents, washed for a minimum time and dried in an oven designed for the purpose. Application of the method has been to metals only.

10a-96. Gravimetric Determination of Thallium with Tetraphenylarsonium Chloride. Wm. T. Smith, Jr. *Analytical Chemistry,* v. 20, Oct. 1948, p. 937-938.

10a-97. Progress Standards—Basic Indicators of Work of Laboratories (Analytical). (In Russian.) A. M. Dymov, M. V. Babaev, P. I. Shportenko, P. N. Tereshchenko, E. I. Grenberg, P. Ya. Yakovlev, T. I. Veitablit, N. E. Klaz, N. V. Tananaev, K. A. Nabatova, D. V. Bashkirov, K. I. Nikolskaya, and E. Ya. Shmulevich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 897-918.

A series of articles indicating the times allotted for different analyses in Russian analytical laboratories. Gravimetric, volumetric, colorimetric, spectrometric, and polarographic determinations as applied to different metals, alloys, and ores. Much of the information is shown in tables.

10a-98. Improved Apparatus for the Extraction of Iron by Ether. (In Russian.) A. M. Daemov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 995-997.

The apparatus is applicable to determination of iron in alloys; method of use.

10a-99. Colorimetric Determination of Manganese Compounds Present in the Air. (In Russian.) D. N. Finkelshtein and A. I. Kruzhevnikova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 998-1000.

A new method for analysis of the fumes given off during smelting of manganese steels and alloys in electric furnaces.

10a-100. Colorimetric Determination of Aluminum and Titanium in High Temperature Alloys. Louis Silverman. *Chemist Analyst,* v. 37, Sept. 1948, p. 62-64.

Details of procedure.

10a-101. Application of Triethanolamine to the Spectrophotometric Determination of Copper in Ores. J. P. Mehlig and Dorothy Durst. *Chemist Analyst,* v. 37, Sept. 1948, p. 52-55.

Method which depends upon formation of a complex copper compound with triethanolamine and measuring the transmittancy at 650 mu of the resulting color system. Results agree closely with those obtained by the iodide method.

10a-102. A Direct Reading Analytical Spectroscope. Frederick K. Vreeland. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 600-611.

A system of spectroscopic analysis is described which eliminates measurement of wave lengths and reference to tables by direct comparison of the spectrum of the sample with master spectra of the several elements.

10a-103. Notes on the reliability of the X-Ray Diffraction Spectrometer for Quantitative Mineral Analysis. Howard F. Carl. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 645-648.

Discusses criticism of recent paper by the author.

10a-104. X-Ray Fluorescence Analysis. J. L. Abbott. *Iron Age,* v. 162, Oct. 28, 1948, p. 58-62; Nov. 4, 1948, p. 121-124.

Nondestructive method for analysis of metallic and nonmetallic substances which can be applied to finished products as well as to raw materials. Principles and a description of methods, particularly for metals. Concluding article describes various specific applications and includes X-ray fluorescence-spectra patterns for 16-25-6 alloy and for tungsten.

10a-105. Analytical Methods in Plating Baths. J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 46, Nov. 1948, p. 68-75.

Specific analytical methods for acids, ammonia, cadmium, carbonate, chloride, chromium, copper, cyanide, gelatine gold, indium, iron, lead, nickel, resorcinol, Rochelle salt, silver, sodium acetate, sodium hydroxide, sodium thiocyanate, sulphate, tin, and zinc.

10a-106. L'importance des réactifs organiques dans le développement moderne de la chimie analytique. (The Importance of Organic Reagents in the Modern Development of Analytical Chemistry). Paul E. Wenger. *Bulletin de la Société Chimique de France,* July-Aug. 1948, p. 721-725.

Organic reagents used in determination of copper nickel, aluminum, zirconium, iron, silver and cobalt. Principles for choosing the proper reagent.

10a-107. Etude critique des réactions des cations. (Critical Study of Some Cationic Reactions.) **I. Nickel.** Simonne Peltier, Thérese Duval, and Clément Duval. **II Cobalt.** (Mme) Raymonde Duval and Clément Duval. **III. Rhenium.** Clément Duval. **IV. Uranium.** Thérese Duval and Clément Duval. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 301-315.

A critical study of the various spot-test analytical reactions for the above cations proposed during 1937-1947. 101 ref.

10a-108. A Colorimetric Determination of Thorium. (In English.) B. F. Rider and M. G. Mellon. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 370-376.

Method based upon the precipitation of thorium oxalate and the subsequent reaction of the excess unprecipitated oxalate ions with permanganate.

10a-109. Notes on Masking of Molybdenum. Tungsten, and Vanadium Reactions by Fluoride. (In English.) F. Feigl. *Analytica Chimica Acta.* v. 2, Sept. 1948, p. 397-401.

It was found that in solutions containing acids and fluoride ions, the precipitation and color reactions of molybdate, tungstate, and largely those of vanadate ions, do not occur. "Demasking" is possible by addition of boric acid.

10a-110. Diaminobenzidine as a Reagent for Vanadium and Selenium. (In English.) J. Hoste. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 402-408.

Results of an investigation of diaminobenzidine as a qualitative spot-test reagent. Action of 54 ions vs. this reagent.

10a-111. Notes on Analytical Procedures. V. Analysis of Pyrites. (In English.) H. A. J. Pieters. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 411-416.

Recommended procedures for the analysis of pyrites and results of control analyses.

10a-112. Iodine Monochloride End Point in Titration of Tripositive Antimony; Titration With Iodate, Permanganate, and Ceric Solutions. Edward W. Hammock, Rupert A. Brown, and Ernest H. Swift. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1048-1050.

10a-113. Separation and Microdetermination of Small Amounts of Aluminum. Thomas D. Parks and Louis Lykken. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1102-1106.

Aluminum is separated from large amounts of common interfering metals by sodium carbonate fusion. It is then accurately and rapidly determined by polarographic, colorimetric, or ultra-violet-absorption means. 16 ref.

10a-114. Metallo-Organic Precipitates in Inorganic Analysis; Investigation by Electron Microscopy. Robert B. Fischer and Stanley H. Simonsen. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1107-1109.

The Ni, Pd, and Bi derivatives of dimethylglyoxime were systematically investigated to determine the effects of concentration of test solution, method of precipitation, and presence of foreign ions. Useful information of value in determining the optimum procedure to be followed in analysis was thus obtained.

10a-115. Spectrophotometric Determination of Aluminum With Eriochromecyanine. W. E. Thrun. *Analytical Chemistry,* v. 20, Nov. 20, 1948, p. 1117-1118.

Details of reagent preparation, procedure, and precision.

10a-116. Multiple Dropping Mercury Electrodes. Clark E. Bricker and N. H. Furman. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1123.

Authors' experiences indicate that multiple electrodes may cause irregular fluctuations in current at the tops of polarographic waves, making it difficult or impossible to estimate wave heights accurately.

10a-117. A Colorimetric Method for Determining Nickel Concentration in Nickel Dip Tanks. R. C. Willey. *Enamelist,* v. 25, Nov. 1948, p. 16-17.

Includes calibration curve.

10a-118. Control by Invisible Light. *Fortune,* v. 38, Dec. 1948, p. 133-135.

Principles and uses of spectrochemical analysis by industry.

10a-119. Nature of the Minimum Current During Discharge of Tin Ions.

(In Russian.) M. Loshkarev and A. Kryukova. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 2, July 1948, p. 805-813.

Results of a study of current variations during precipitation of tin by use of the dropping-mercury electrode, using phenols, diphenylamine, and gelatins as additives. 17 ref.

10a-120. Influence of Concentration of Surface-Active Substances on the Maximum Current During Cathodic Deposition of Tin. (In Russian.) M. Loshkarev and A. Kryukova. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, July 1948, p. 815-822.

Influence of concentration of phenols, diphenylamine, and phenol and cresol sulphonic acids on the process of cathodic deposition of tin from sulphuric acid solutions.

10a-121. Application of Radioactive Indicators in Analytical Chemistry. (In Russian.) N. N. Syvorov. *Uspekhi Khimii.* (Progress in Chemistry), v. 17, July-Aug. 1948, p. 401-431.

Surveys the entire field, including applications to qualitative and quantitative determinations using both chemical and physical means. 340 ref.

10a-122. Thioglycollic Acid as an Inhibitor for Iron in the Colorimetric Determination of Aluminium by Means of "Aluminon". E. M. Chenery. *Analyst,* v. 73, Sept. 1948, p. 501-502.

Recommended procedure.

10a-123. An Improved Apparatus for Rapid Electrodeposition. F. T. Rabbitts. *Canadian Chemistry and Process Industries,* v. 32, Nov. 1948, p. 1023-1025.

Previously abstracted from *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 181-182. See item 10a-28, 1948.

10a-124. Influence of Foreign Ions on Colorimetric Determination of Metals. (In Russian.) A. K. Babko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1028-1037.

Various methods were studied. Advantages and disadvantages of each; and particular applications. 22 ref.

10a-125. Quantitative Spectral Analysis of the Basic Components of Bauxite. (In Russian.) M. M. Kler and M. I. Rezvova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1092-1094.

Method is characterized by the fact that the sample is ground into a homogeneous mass and pressed into a test specimen which is analyzed using a condensed spark.

10a-126. Spectrographic Determination of Chromium in Ferrochrome. (In Russian.) A. V. Kozlova and P. D. Korzh. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1095-1097.

Method for determination of chromium in large concentration (40 to 90%). Comparative data for the spectrographic and for chemical methods.

10a-127. Determination of Molybdenum in Ferromolybdenum by Titration With Methylene Blue. (In Russian.) P. Ya. Yakovlev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1132-1133.

A simple and rapid method which does not require precipitation of Fe.

10b—Ferrous-Base Metals

10b-1. Spectrographic Analysis of Low-Alloy Steel; A Statistical Examination of Sources of Error. H. T. Shirley, E. Elliott, and Joyce Meeds. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 391-409.

Results of a study of a single sample. Readings were taken for Si, Mn, Cr, Ni, and Mo from 30 spectrograms from each of 31 plates taken under conditions involving excitation by means of normal Hilger equipment. Results of some 60,000 readings from over 9000 individual lines were treated statistically to obtain estimates of variability contributions from three main sources: excitation response, small-scale plate variability, and microphotometry.

10b-2. The Direct Colorimetric Determination of Tungsten in Cast Iron. W. Westwood and A. Mayer. *Analyst,* v. 72, Nov. 1947, p. 464-469.

Method based on the formation of a yellow tungsten thiocyanate complex in strong HCl in the presence of stannous chloride. 21 ref.

10b-3. Photocolorimetric Method for Determination of Columbium in Steel. (In Russian.) A. L. Davydov, Z. M. Vaisberg, and L. E. Burkser. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1038-1043.

Method is based on a new color reaction—formation of a blue P-Mo-Cb complex.

10b-4. Semi-Micro Determination of Chromium and Vanadium in Ferrous Metals. (In Russian.) B. A. Generozov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1043-1048.

Semi-micro variations of the volumetric persulphate method suitable for determination of Cr alone, in the absence of V, and for simultaneous determination of Cr and V. 16 ref.

10b-5. Rapid Colorimetric Method for the Determination of Phosphorus in Cast Iron. (In Russian.) K. A. Matveeva. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1136-1137.

Preparation of the colorimetric standards; comparison of the results with those obtained by usual analytical procedures. The method is based on the formation of a blue P-Mo complex whose intensity is proportional to the concentration of phosphorus.

10b-6. The Determination of Columbium in Rustless and Heat Resisting Steels. Part I. B. Bagshawe and W. T. Elwell. **Part II. A Cooperative Examination of Some of the Methods Available.** S. W. Craven. *Journal of the Society of Chemical Industry,* v. 66, Nov. 1947, p. 398-402.

In Part I a procedure is described for the above determination in high-chromium, nickel steel. Provision is made for the presence of W, Ti, and Mo. By a slight adjustment of conditions, tungsten precipitation is quantitative and a simultaneous determination may be made. The efficiency of hydrolysis separations is discussed and a method of sulfurous acid hydrolysis from divalent iron solution is recommended. In Part II, results are given of a cooperative examination of several methods by six laboratories. Various features of the methods are discussed and the order of agreement obtained by different laboratories working independently is shown.

10b-7. Spark Technique in Spectrographic Analysis of Slags. Ralph H. Steinberg and Henry J. Belic. *Analytical Chemistry,* v. 20, Jan. 1948, p. 72-73.

A method for determining lime-silica ratio, of sufficient accuracy for openhearth control.

10b-8. Improved Combustion Technique Speeds Carbon Analysis of Steel. *Steel,* v. 122, Feb. 16, 1948, p. 96.

Time required is reduced from 10 to 8 min. by technique carried out at 1100° C.—about 60° C. higher than the former procedure. Involves simplified preparation of samples with resulting improvement in accuracy.

10b-9. Hydrogen, Nitrogen and Oxygen in Ferrous Metals. Their Properties and Their Determination—Part III. E. C. Pigott. *Metallurgia,* v. 37, Jan. 1948, p. 129-132.

Procedures for determining nitrogen contents.

10b-10. Les Methodes Récentes de Dosage de l'Oxygene, de l'Hydrogene et de l'Azote dans le Fer et les Aciers et Leurs Principales Applications. (Recent Methods for Analysis of Oxygen, Hydrogen, and Nitrogen in Iron and Steels and Their Principal Applications.) Georges Chaudron. *Revue de Métallurgie,* v. 44, May-June 1947, p. 144-154; discussion, p. 155.

Several recently devised methods and the various types of apparatus for oxygen determination. 31 ref.

10b-11. Dosage du Manganese dans les Aciers Faibles Teneurs (0.100 a 0.010%). (Determination of Manganese in Steels; Low Contents—0.100 to 0.010%.) Paul Rocquet. *Revue de Metallurgie,* v. 44, May-June 1947, p. 156-160.

Lingane's method of determining small percentages of Mn in steel is described. This method applies only to a few general types of steels. The colorimetric method, using oxidation by periodate, is preferred to titrimetric methods using persulphate, since the latter give variable results.

10b-12. Le Dosage de l'Oxygene dans les Aciers par Diffusion de l'Aluminium. (Determination of Oxygen in Steels by Diffusion of Aluminum). Jean Massinon. *Revue de Métallurgie,* v. 44, May-June 1947, p. 174-179.

Steel specimens coated with a mixture of powdered aluminum and aluminum oxide were heated to 1300° C., at which temperature Al displaced the oxygen in the pores of the sample. Data are tabulated.

10b-13. Ferrocyanide Photocolorimetric Method for Determination of Vanadium. (In Russian.) R. V. Vorontosov. *Zavodskaya Laboratoriya* (Factory Laboratory) v. 13, Oct. 1947, p. 1155-1157.

Method is applicable to pure salts and to Cr-Ni-V steels and gave satisfactory results for concentrations of Vanadium from 0.05 to 2.26%.

10b-14. Rapid Method for Phosphorus Determination in Steel. (In Russian.) B. Ya. Barkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1253-1254.

Proposes a series of improvements by which the time required is claimed to be reduced from 25 or 30 min. to about 13 min.

10b-15. Semi-Quantitative Spot-Test Analysis of 18-8 Cr-Ni Steels. (In English.) A. Claeys and J. Gillis. *Analytica Chimica Acta,* v. 1, Nov. 1947, p. 364-370.

Procedures for surface preparation of the samples and for estimation of chromium, nickel, molybdenum and titanium.

10b-16. Methods for Separation of Carbides From Ferrous Alloys. (In Rus-

sian.) G. A. Medvedeva. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1413-1421.

Existing methods are critically reviewed. Experimental work indicates that an electrolytic method developed by the author results in the most complete separation of carbides.

10b-17. Gravimetric Determination of the Carbide Phase in Carbon Steels. (In Russian.) N. M. Popova and M. F. Rybina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1421-1425.

Experimental investigation of the electrolytic method described showed that it results in complete separation of carbides from steels containing less than 1% in any structure resulting from heat treatment.

10b-18. Method for Determination of Carbides in Alloy Steels. (In Russian.) M. M. Shapiro. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1425-1430.

An electrolytic method which is particularly applicable to high speed steels and which eliminates the influence of oxidation and adsorption during electrolysis.

10b-19. Determination of Hydrogen in Steel. (In Russian.) A. N. Morozov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1485-1487.

Existing methods were compared.

10b-20. The Sampling and Analysis of Steel for Hydrogen. G. Derge, W. Poifer, and J. H. Richards. *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 343-344, 355, 362. A condensation.

Methods of sampling and analysis which have been developed and their usefulness and limitations. Application to the behavior of hydrogen in rail steel. (Presented at A.I.M.E. meeting, New York, Feb. 15-19, 1948.)

10b-21. Contribution au Dosage du Vanadium dans les Aciers et les Ferrovanadium. (Contribution to the Determination of Vanadium in Steels and Ferrovanadium Alloys.) Robert Lannet. *Revue de Métallurgie,* v. 44, July-Aug. 1947, p. 210-220.

After examining potentiometric and oxidation-reduction methods, the author concluded that the use of phosphoric acid is the simplest method for rapid, accurate determination of vanadium alone. For successive determinations of Mn, Cr, and V, the electrotitrimetric method has some advantages. 11 ref.

10b-22. Quantitative Spectrochemical Analysis of Steel. (In English.) J. Gillis and J. Eeckhout. *Analytica Chimica Acta,* v. 1, Dec. 1947, p. 377-389.

Operating conditions for the spectrochemical analysis of iron and carbon-steel, using solutions, which are said to result in more satisfactory results than solid electrodes. Investigation was carried out with a Hilger medium spectrograph. Analysis lines and tables are given for determination of the contents of Ni, Mn, Cr, Co, Ti, Al, Mo, V, Zr, As, Cu, Nb, and Ta. 24 ref.

10b-23. Hydrogen, Nitrogen and Oxygen in Ferrous Metals; Their Properties and Their Determination—Parts IV and V. E. C. Pigott. *Metallurgia,* v. 37, Feb. 1948, p. 181-184; March 1948, p. 263-266.

Details of methods for oxygen determination. (To be continued.)

10b-24. A Critical Examination of a Perchloric Acid Colorimetric Method of Analysis for Chromium in Carbon and Low Alloy Steel; Report of the Methods of Analysis Committee of the Metallurgy Division of the British Iron and Steel Research Assoc. *Metallurgia,* v. 37, Feb. 1948, p. 211-216.

The method is very simple and rapid, but several factors exert a marked effect on the color intensity of the solution and it is not considered suitable as a standard method. Under routine conditions, however, the method has obvious advantages.

10b-25. Determination of Silicate Inclusions in Steel. J. Kamecki and A. Kotlinski. *Nature,* v. 161, March 13, 1948, p. 402.

Procedure using dissolution in acetic acid. Comparison with accepted methods gives satisfactory results. Use for determination of Al_2O_3 in steel was also satisfactory.

10b-26. An Investigation of the Use of Geiger-Muller Photo-Electron Counters in the Spectrographic Analysis of Phosphorus in Steel. Richard Hanau and Ralph A. Wolfe. *Journal of the Optical Society of America,* v. 38, April 1948, p. 377-383.

Construction of the counters and methods of electrically shielding and mounting them on the Littrow spectrograph. The adjustments of counter orientation, slit widths, and focus with reference to the analyses of ferrous alloys where good resolution is necessary. Because of absorption of radiation by quartz at low wave-lengths, both absolute and relative intensities are dependent upon the position of the arc on the electrode surface. This effect, which results in appreciable error was investigated photographically and with G-M counters. 20 ref.

10b-27. The Cenco-Derge Rapid Oxygen Determination. J. H. Richards. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 160-164; discussion, p. 164-168.

Use of the Cenco-Derge vacuum-fusion equipment is said to be one of the first attempts to use a measured rather than a calculated value for the oxygen content of liquid steel as a basis of deoxidation control. Results of a study of variations in rejections associated with inconsistent deoxidation, using both tap carbon and tap oxygen as criteria.

10b-28. A Rapid Spectrographic Control Method for Determination of Lime-Silica Ratios in Openhearth Slags. J. F. Woodruff. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 179-184; discussion, p. 184-186.

Development of a satisfactory method.

10b-29. A Direct Reading Spectrometer for Ferrous Analysis. Stanley H. Walters. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 281-287; discussion, p. 287-289.

10b-30. Detecting Residual Elements in Steel by Spectrographic Analysis. Hubert Swett. *Steel,* v. 122, May 3, 1948, p. 106, 109, 128, 130.

New installation at San Francisco plant of Bethlehem Pacific Coast Steel Corp.

10b-31. A Discussion on Routine Chemical Methods for the Analysis of Niobium and Tantalum Bearing 18-8 Steels. B. Rogers. *Metallurgia,* v. 37, April 1948, p. 326-330.

Essential chemical principles involved in determination of Cb, Ta, and W in steel; T. R. Cunningham's procedure and its application to the analysis of these steels when 0 to 0.6% W is present with Mo in varying amounts, and up to 0.1% Ti is present; analysis when the amount of tungsten is greater; and determination of the additional alloying elements Co, Cu, Sn, and Se. 42 ref.

10b-32. Determination of Selenium in Steel. (In Russian.) N. A. Tananaev and V. I. Muracheva. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, Jan.-Feb. 1948, p. 3-6.

New gravimetric method utilizes slightly heated 1:4 H_2SO_4 for dissolution of the steel.

10b-33. Volumetric Determination of Trivalent Iron Using Tartrates. (In Russian.) A. V. Pavlinova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, Jan.-Feb. 1948, p. 7-10.

Development of method which is based on reaction with $FeCl_3$ followed by titration of the acid formed.

10b-34. Determination of Small Amounts of Carbon in Steel; Evaluation of Low-Pressure Combustion Apparatus. John J. Naughton and Herbert H. Uhlig. *Analytical Chemistry,* v. 20, May 1948, p. 477-480.

The discrepancy between carbon values for the low-pressure combustion method and the standard combustion method was investigated. All results show the reliability of the former method.

10b-35. Rapid Routine Method for Testing Stainless Steels. J. B. Culbertson and R. M. Fowler. *Steel,* v. 122, May 24, 1948, p. 108, 110, 113.

Procedure using the Beckman spectrophotometer for determining the quantity of Cr, Ni, and Mn in stainless steels. (Presented at Analytical Symposium, Pittsburgh, Feb. 12-13, 1948.)

10b-36. Dosage Rapide du Cobalt dans les Aciers. (Rapid Determination of Cobalt in Steel.) B. Emile Jaboulay. *Revue de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 302-306.

Cyanometric method differs from others in that tartaric or citric acids are not used, the iron being separated prior to the titration.

10b-37. A Study of the Cobalt-Ferricyanide Reaction With Relation to the Determination of Cobalt in Steel. B. Bagshawe and J. D. Hobson. *Analyst,* v. 73, March 1948, p. 152-157; discussion, p. 157.

Suitability of method for routine work, but authors found certain fundamental sources of errors which impair the value of the method where maximum accuracy is desired.

10b-38. Hydrogen, Nitrogen and Oxygen in Ferrous Metals. (Concluded.) E. C. Pigott. *Metallurgia,* v. 38, May 1948, p. 6-12.

Procedure for each of the four recognized methods for determining oxygen.

10b-39. Determination of Alumina in Iron Ore. G. Frederick Smith and F. Wm. Cagle. *Analytical Chemistry,* v. 20, June 15, 1948, p. 574-576.

New procedure involves formation

of ferrous-bipyridine complex not precipitated by ammonium hydroxide or carbonate. Aluminum in small amounts can be separated from large amounts of iron in one precipitation.

10b-40. Die Spektrochemie im Betriebslaboratorium der Eisen- und Stahlindustrie. (Spectrochemistry in the Laboratories of the Iron and Steel Industry.) H. Moritz. *Archiv fur Metallkunde,* v. 1, March 1947, p. 115-121.

Comparative analysis of German and American practice.

10b-41. New Method for Determination of Tungsten in Steel Using B-Naphthoquinoline. (In Russian.) R. B. Golubtsova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, March-April 1948, p. 118-122.

Compound is recommended for qualitative precipitation of small or large amounts of tungsten. Of all the elements present in steel, only W and Mo react with this compound. Reaction with Mo may be eliminated by proper adjustment of acidity.

10b-42. An Industrial Application of Geiger Muller Counters to the Analysis of Phosphorus in Steels. Ford R. Bryan and George A. Nahstoll. *Journal of the Optical Society of America,* v. 38, June 1948, p. 510-517.

Use of a Littrow quartz spectrograph equipped with Geiger-Muller photo-electron counter tubes for rapid and accurate determination.

10b-43. The Sampling and Analysis of Steel for Hydrogen. G. Derge, W. Peifer and J. H. Richards. *Metals Technology,* v. 15, June 1948, T. P. 2362, 28 pages.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 343-344, 355, 362. See item 10b-30, 1948.

10b-44. Apparatus for the Hot-Extraction Analysis for Hydrogen in Steel. Clarence E. Sims and George A. Moore. *Metals Technology,* v. 15, June 1948. T. P. 2369, 10 pages.

General construction and operation of apparatus for quantitative hot extraction of hydrogen from steel for analytical purposes in a high vacuum up to 1050° C. for periods of 40 hr. or more.

10b-45. The Colorimetric Estimation of Tungsten in High Speed Steels Using Ammonium Thiosyanate and Titanous Chloride. R. St. J. Emery and D. W. Curtis. *Metallurgia,* v. 38, June 1948, p. 113-114.

A method in which the Spekker Absorptiometer is used.

10b-46. A Direct-Reading Silicon Meter for Electrical Sheet Steels and a Note on Resistivity. N. F. Astbury and S. P. Roper. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 191-193.

The product or resistivity and density of silicon iron sheets containing not more than 5% Si and 0.5% total trace elements is for practical purposes a linear function of Si content. Therefore, the potential drop between fixed points on a rectangular strip of fixed superficial size, carrying a current proportional to its mass, is a linear function of silicon content. The meter uses this principle. The effect of nonuniformity of silicon distribution on apparent resistivity.

10b-47. On the Electrometric Determination of Vanadium in Steels. (In English.) A. Claassen and J. Corbey. *Recueil des Travaux Chimiques des Pays-Bas,* v. 67, Jan. 1948, p. 5-10.

In tungsten-free steels, vanadium is determined by titration with ferrous sulphate under specified conditions of acidity. It is shown that this method gives low results due to the incomplete reduction of the vanadophosphatotungstate complex; complete reduction however takes place by boiling with excess ferrous sulphate, enabling the determination to be finished by electrometric titration with standard permanganate. 10 ref.

10b-48. The Determination of Cerium in Cast Iron. W. Westwood and A. Mayer. *Analyst,* v. 73, May 1948, p. 275-282.

Colorimetric methods for determination of small amounts of Ce in plain and alloy cast irons. Interference from alloying elements is encountered only with high Mn irons and highly alloyed irons of the Ni-Resist type. For these materials a preliminary mercury cathode separation is used. The method is not applicable to samples containing more than 0.3%. 14 ref.

10b-49. The Absorptiometric Determination of Chromium in High-Speed Steels by Sodium Chlorate Oxidation. F. E. Eborall, *Metallurgia,* v. 38, July 1948, p. 135-136.

Sodium chlorate is used to oxidize iron, tungsten, carbides and as a quantitative oxidant for chromium. Manganese partially oxidizes to manganese dioxide. Improved decomposition of the carbides is obtained as compared with nitrate oxidation. Tungsten and manganese dioxide are eliminated by filtration. Vanadium, molybdenum, nickel and cobalt can be determined as in the compound method.

10b-50. Beitrag zur Bestimmung oxydischer Einschlusse im Stahl. (Determining Oxide Inclusions in Steel.) Herbert Henkel, *Zeitschrift fur Analytische Chemie,* v. 128, no. 1, 1947, p. 26-41.

Method and results of electrolytic analyses of hardened steels. The silica content in steel is determined by an entirely new method. 12 ref.

10b-51. Method of Determination of the Presence of Carbon in Steel. (In Russian.) U. A. Klyachko and M. M. Shapiro. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 549-555.

Proposes a method of separating free carbon and carbide, using a heavy liquid of specific weight between those of carbon and carbide. The method is tested on tungsten and chromium steel subject to the usual heat treatment.

10b-52. Isolation of Carbide Phases in Stable Condition. (In Russian.) V. M. Popova and M. F. Raebina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 555-557.

Apparatus for isolation of carbide in stable conditions, and the anodic application of standard steels during continuous removal of the precipitate.

10b-53. Discussion of the Influence of Size and Mass of Specimens on the Results of Spectrographic Analysis of Steels. (In Russian.) V. G. Koritsky and T. B. Edneral. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 558-565.

Decreasing the dimensions of test specimens below standard magnitudes causes progressive error in the spectrographic determination of different elements in steels.

10b-54. Spectral Analysis of Slag. (In Russian.) N. V. Byanov. *Zavodskaya Laboratoriya.* (Factory Laboratory), v. 14, May 1948, p. 565-570.

The method of Vargina-Sventitsky for determination of traces of iron in sand is applied to the analysis of slags, with a possible error of about 5%. The time of analysis for seven different compounds is 20 to 25 min.

10b-55. Spectral-Analytical Determination of Carbon in Steels and Cast Irons. (In Russian.) K. A. Sukhenko and N. P. Yakovleva. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 625.

Carbon determination by spectral analysis. The conditions of investigation and the results obtained.

10b-56. Accumulation of Traces of Arsenate by Coprecipitation With Magnesium Ammonium Phosphate. I. M. Kolthoff and C. W. Carr. *Analytical Chemistry,* v. 20, Aug. 13, 1948, p. 728-730.

By quantitative coprecipitation 0.075 mg. of arsenic dissolved in 500 ml. of solution can be determined with an accuracy of 2%. Metal ions that are precipitated in ammoniacal medium are made harmless by the addition of an excess of tartrate. The method can be applied to the determination of arsenic in steel that contains more than 0.01% of arsenic.

10b-57. Simple Tests for Identifying Cast Irons. *Welding Engineer,* v. 33, Sept. 1948, p. 67.

Information is given in tabular form.

10b-58. Estimation of Molybdenum in Iron and Steel; A Rapid Method Using a Simple Photometer. E. J. Ronnie. *Metallurgia,* v. 38, Aug. 1948, p. 235-236.

10b-59. Analyzing Malleable Iron; A Rapid Method for Cr, Si, and Mn Determinations. W. B. Sobers. *American Foundryman,* v. 14, Sept. 1948, p. 56-58.

Details of combined method. Si is determined gravimetrically; Mn, volumetrically; Cr, colorimetrically. Cu, Ni, Mo, and P can also be determined colorimetrically on aliquot parts of the master solution. Heat treatment and decarburization were found to have no effect on the analysis and distribution of Cr, in malleable iron.

10b-60. Photo Electric Method for Determination of Silicon, Phosphorus, Manganese, Chromium, and Nickel in Steel Using One Weighed Portion. (In Russian.) V. F. Mal'tsev and V. Va. Sych. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 868-871.

Calibration curves and table of typical data. 10 ref.

10b-61. Rapid Method for Determination of Iron Oxides in Iron Ores, Agglomerates, and Blast-Furnace Dust. (In Russian.) A. M. Charova and E. B. Rutenburg. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 872.

Simple volumetric method said to require only 10 to 15 min. for results of satisfactory accuracy.

10b-62. Combined Method for Spectrophotometric Analysis of Gray Iron. G. T. Henderson. *Foundry,* v. 76, Oct. 1948, p. 93, 224, 226, 228, 230.

An improved method utilizing a Model 11 Coleman spectrophotometer. Alloys determination of Si, Mn, P, Cr, Ni, and Mo from a solution prepared from a single sample.

10b-63. Photo-Electric Method of Determination of Aluminium in Steel. T. P. Temirenko. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 361. Translated and abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, no. 5, 1947, p. 621-623.

Previously abstracted from original. See item 10-212, 1947.

10b-64. Determination of Iron and Manganese Sulphide Inclusions in the Metal of Welded Seams. (In Russian.) E. E. Cheburkova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 654-657.

Results of a study of a method of electrolytic dissolution of the metal previously reported in the Russian literature and of the Schulte method for determination of sulphur in the residue.

10b-65. Determination of Chromium and Iron Carbides in Austenitic Chromium Nickel Steels. (In Russian.) N. M. Popova and A. J. Platonova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 658-661.

Develops a method for the above based on the use of an acid solution of chloride with additions of thiosulphate. Experimental data.

10b-66. Determination of Silicon in Ferrosilicon by a Specific-Volume Method. (In Russian.) M. V. Babaev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 661-668.

Investigated the method used for low-carbon steels. A new apparatus for specific-volume determinations.

10b-67. Rapid Method of Determination of Chromium in Ferrochromium Without Use of Silver Nitrate. (In Russian.) A. G. Bogdanchenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 752-753.

Proposes the use, as an oxidation medium, of 1:4 H_2SO_4. Procedure described.

10b-68. Determination of Chromium in Ferrochrome Without Use of Silver Nitrate. (In Russian.) M. V. Babaev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 754.

Another variation of the method is proposed. (See above abstract.)

10b-69. Determination of Silicon in Silicon-Containing Spring Steel With Aid of the "Steeloscope". (In Russian.) G. P. Preobrazhenskaya. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 759.

Spectrographic method, using special apparatus known as the "steeloscope".

10b-70 Rychlé urceni siry v zeleze a oceli metodou planochronometrickou. (Planochronometric Method for Rapid Determination of Sulphur in Iron and Steel.) A. Glazunov and R. Jirkovsky. *Hutnické Listy* (Metallurgical Topics), v. 3, Aug. 1948, p. 229-230.

Method is based on reaction of HCl with a flat piece of iron. H_2S is evolved and is absorbed for a fixed period of time by special reagents. The S content is determined colorimetrically or by microtitration.

10b-71. Spectroscope Used to Identify Stainless Steel Grades. *Iron and Steel Engineer*, v. 25, Oct. 1948, p. 71.

New practice at Wood works of Carnegie-Illinois Steel Corp.

10b-72. Polarographic Determination of Copper and Nickel in Steels. (In Russian.) A. G. Stromberg, R. V. Dityatkovskaya, and N. V. Milovanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 919-925.

Absorption of copper and nickel by ferric hydroxide precipitated with ammonia was investigated. On the basis of data obtained, a method for the determination is proposed. Application on industrial scale showed satisfactory results.

10b-73. Nephelometrische Schwefelbestimmungen in Eisen und Stahl. (A Nephelometric Method for Determining Sulphur in Iron and Steel.) G. Geuer. *Schweizer Archiv fuer angewandte Wissenschaft und Technik*, v. 14, Sept. 1948, p. 275-278.

Method based on the measurement of turbidity caused by the reaction of H_2SO_3 with the acetates of lead and sodium. The method, and typical results. 11 ref.

10b-74. The Determination of Copper in Carbon and Low-Alloy Steels. *Metallurgia*, v. 38, Oct. 1948, p. 342-345.

The principle involved depends upon sulphide separation of the copper, ignition, and solution in nitric and sulphuric acids, followed by iodometric titration.

10b-75. The Determination of Silicon and Manganese in Iron and Steel. *Metallurgia*, v. 38, Oct. 1948, p. 346-352.

Methods submitted as recommended standard procedures to the British Standards Institution. The silicon method is based on perchloric acid dehydration, and the manganese method on zinc oxide separation of the Fe-Cr group and determination by ferrous sulphate and potassium dichromate titration following silver nitrate-ammonium persulphate oxidation.

10b-76. Rapid Estimation of Slag Basicity. W. A. Smith, J. Monaghan, and

W. Hay. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 121-130.

Experiments were made on the pH method of estimating slag basicity. Examination of all relevant factors failed to improve accuracy. A new method was developed in which specific conductance of the water extract is measured and related to the $CaO/(SiO_2 + P_2O_5)$ ratio of the slag. On homogeneous slags this ratio can be estimated within ± 0.15 in a little over 20 min. The method is affected by the presence of undissolved lime in the sample, but is reliable when the sample is homogeneous.

10b-77. Rapid Determination of Carbon Content in Steels. P. A. Haythorne and Burton R. Payne, Jr. *American Machinist,* v. 92, Nov. 18, 1948, p. 124-125.

How discrepancies in heat treatment of particular lots of parts can be accounted for by determining carbon content from maximum hardness by means of a curve.

10b-78. Shop Tests for Identifying Cast Irons. *American Machinist,* v. 92, Nov. 18, 1948, p. 143.

10b-79. Applications of Emission Spectrography in Ferrous Analysis. S. D. Steele. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 6-28; discussion p. 29-44.

The assistance offered by these methods in metallurgical problems. 15 ref.

10b-80. The Colorimetric Determination of Nickel, Chromium, and Manganese in Steel. (In English.) H. A. J. Pieters, W. J. Hanssen, and J. J. Geurts. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 377-396.

With the aid of the Spekker absorptiometer the colorimetric determinations of nickel (with dimethylglyoxime), chromium (with diphenylcarbazide) and manganese (after oxidation with periodate) in steel were critically surveyed. Recommended procedures. 13 ref.

10b-81. Ferrous Metallurgical Analysis Techniques and Their Choice. E. C. Pigott. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 123-131.

The various methods. Tables showing the relationships and characteristics of the various quantitative and semi-quantitative techniques. Economic factors. The electronic phenomena involved in the various methods are emphasized and used as a basis for classification. 16 ref.

10b-82. Spectroscope Used to Identify Stainless Grades. *Steel Processing,* v. 34, Nov. 1948, p. 598-599.

10b-83. Etude du dosage de faibles quantités de chrome dans les fontes. (Study of the Determination of Small Quantities of Chromium in Cast Iron.) P. Gaillard and F. Gayte. *Revue de Métallurgie* v. 45, Aug. 1948, p. 249-253.

Critically analyzes three volumetric methods. Advantages and disadvantages of each.

10b-84. Photocolorimetric Method of Analysis of Non-Metallic Inclusions in Carbon Steels. (In Russian.) N. F. Leve and S. S. Sandmirskaya. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1043-1051.

Proposes a new method characterized by high accuracy, rapidity, and low reagent cost. Analyses of four different types of steel, showing advantages of the method. 12 ref.

10b-85. Qualitative Determination of Copper in Steels by Means of Colorimetric Titration Using Dithizone. (In Russian.) I. B. Suprunovich and A. B. Konovalova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1061-1063.

Details of method characterized by the noninterference of Ni and Co. Typical analyses. Time of determination is 25 to 30 min.

10b-86. Accelerating the Analysis of Cast Iron During the Blast-Furnace Process. (In Russian.) A. G. Bogdanchenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1064-1069.

A new method for sampling of cast iron during its melting in the blast furnace. A special mold for such sampling. Experimental investigation indicates applicability on an industrial scale.

10b-87. Determination of Molybdenum in High-Chromium Steels. (In Russian.) E. I. Grenberg and M. O. Ashkinazi. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1133.

Modifications of the photo-electric method of Davidov and Maltsev permitting determination of Mo in steels containing up to 13% Cr.

10b-88. The Determination of Chromium in Iron and Steel. *Metallurgia,* v. 39, Nov. 1948, p. 41-45.

A method of analysis based on silver nitrate-ammonium persulphate catalytic oxidation, previously tested for steels of low-Cr content, was further investigated in order to extend its application to a wide variety of Cr-alloy steels. The principle is valid for all Cr contents; and a procedure is described which is applicable to all classes of Cr steel.

10b-89. Slag Basicity; Methods of Rapid Estimation. W. A. Smith, J. Monaghan, and W. Hay. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 579-583; discussion, p. 595.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 121-130. See item 10b-76, 1948.

10c—Nonferrous-Base Metals

10c-1. The Determination of Calcium Sulphate in Sulphide Ores. R. S. Young and A. J. Hall. *Journal of the Society of Chemical Industry,* v. 66, Oct. 1947, p. 375.

Ammonium chloride solution was found to be a satisfactory solvent for anhydrite, and also for gypsum. By this solution, the sulphur contained in base-metal sulphides and barite and the sulphur in the anhydrite can be distinguished. Celestite does not give satisfactory results by this method.

10c-2. The Stability of the Cobaltous Thiocyanate Complex in Ethyl Alcohol-Water Mixtures and the Photometric Determination of Cobalt. Norbert Uri. *Analyst,* v. 72, Nov. 1947, p. 478-481.

Stability was determined at various concentrations of ethyl alcohol and ammonium thiocyanate. The degree of dissociation of the complex was calculated on the basis of photometric extinction measurements. Conditions were worked out for the photocolorimetric determination of cobalt by the thiocyanate method in ethyl alcohol and water mixtures.

10c-3. An Indicator Changing at pH 0.5 for the Control of Sulphide Precipitation. H. G. Andrew. *Analyst,* v. 72, Nov. 1947, p. 481-482.

Results of experiments suggest that use of a mixed indicator showing clearly when the pH of a solution is close to 0.5 is advantageous in improving the accurate separation of the Group II metals and also makes aluminum easier to detect.

10c-4. Polarographic Analysis of Zinc Die-Casting Alloys. Milton Sherman. *Die Castings,* v. 6, Jan. 1948, p. 32, 34, 36-37.

Suitability of the above method for rapid analysis of impurities in die-cast metal without sacrifice of accuracy.

10c-5. Spectrographic Analysis of Nickel Alloys. C. J. Neuhaus. *Iron Age,* v. 161, Jan. 22, 1948, p. 62-65.

Some interesting and unusual analytical techniques. Methods that provide for the analysis of thin materials, materials in low concentration, and small areas such as inclusions and cracks.

10c-6. Mode Rapide d'Identification, par Voie Microchimique, des Moindres Parcelles de Cobalt et de Nickel a l'État Métallique. (Rapid Method of Identification, by Microchemical Means, of Minute Particles of Metallic Cobalt and of Nickel). Georges Deniges. *Comptes Rendus* (France) v. 225, Nov. 10, 1947, p. 841-843.

Detailed report of methods.

10c-7. Hydrogen Content of Electrolytic Chromium and Its Removal. E. V. Potter and H. C. Lukens, *Metals Technology,* v. 15, Jan. 1948, T.P. 2312, 8 pages.

In an earlier investigation, the gas content of electrolytic manganese was determined and methods developed for removing most of it without detrimentally affecting the properties of the metal. Results of a similar investigation and use of a similar removal method on electrolytic chromium.

10c-8. Removal of Manganese in Determinations of the Zinc, Calcium, and Magnesium of Manganese Ores and Products. Robert L. Evans. *Analytical Chemistry,* v. 20, Jan. 1948, p. 87.

The precipitation of Mn from concentrated HNO_3 solutions by potassium chlorate is a standard "separation" method in its determination. It was found that this precipitation was an excellent Mn "removal" method in determining Zn, Ca, and Mg contents of high Mn ores and products.

10c-9. Analysis of Copper and Nickel Slags and Mattes. J. Kinnunen. *Metallurgia,* v. 37, Jan. 1948, p. 153-156.

Simple and rapid methods which have been found to give satisfactory results. 14 ref.

10c-10. Determination of Copper in Tin Bronzes and Brass Without Separation of Tin. (In Russian.) G. I. Veitsblit. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1255.

New method using a mixture of HF and HNO_3. Drawback is action of this solution on glass.

10c-11. Zur Quantitativen Bestimmung des Bleis als Salz der Gallussäure. (Quantitative Determination of Lead as a Salt of Gallic Acid). C. Maye. *Monatshefte fur Chemie,* v. 77, 1947, p. 5-75.

A method involving conversion to lead sulphate.

10c-13. The Cerimetric Determination of Copper and Antimony. (In English.) R. Pribil and T. Chlebovsky. *Collection of Czechoslovak Chemical Communications,* v. 12, Sept.-Oct. 1947, p. 485-501.

Results of a study of the conditions for the cerimetric determina-

tion of copper following its reduction to the univalent state by a solution of chromous chloride. Methods for the determination of copper in alloys (brass, bronze) and for the determination of copper, antimony, and arsenic in alloys of lead and tin are presented.

10c-14. Determination of Manganese in Nickel, Cupro-Nickel, Nickel-Silver and Brass. M. Brut. *British Chemical Digest,* v. 2, Feb. 1948, p. 169-170. Translated and condensed from *Chimie Analytique,* v. 29, March 1947.

Two volumetric procedures.

10c-15. The Analytical Aspects of Thorium Chemistry. Therald Moeller, George K. Schweitzer, and Donald D. Starr. *Chemical Reviews,* v. 42, Feb. 1948, p. 63-105.

A review. 276 ref.

10c-16. Removal of Metals at the Mercury Cathode; Separation of Interfering Metals in the Determination of Aluminum, Alkaline Earth, and Alkali Metals. Thomas D. Parks, Hilton O. Johnson, and Louis Lykken. *Analytical Chemistry,* v. 20, Feb. 1948, p. 148-151.

Methods are based on the use of a previously described unitized mercury-cathode apparatus suitable for industrial analytical applications. Procedures are given for the removal of 0.5 to 5.0-gram quantities of easily removable metals such as Fe, Cu, Zn, Ni, Co and for the removal of somewhat smaller quantities of Cr, Pb, Sm and Mo which are not deposited under ordinary conditions. Results demonstrate the satisfactory extent to which these metals are removed and indicate optimum values of such factors as voltage, current, surface area of the mercury, distance between electrodes, and time of electrolysis. 10 ref.

10c-17. Volumetric Estimation of Thallium. B. C. Mehrotra. *Nature,* v. 161, Feb. 14, 1948, p. 242.

Use of bromphenol blue as indicator.

10c-18. Sulphur Determination; Volumetric Method for Copper-Base Alloys. M. Sherman. *American Foundryman,* v. 13, March 1948, p. 52-53.

After evaporating to fumes with perchloric acid, the sulphuric acid is reduced with a mixture of hydriodic and hypophosphorus acid to hydrogen sulphide. The latter is distilled into an ammoniacal cadmium chloride solution and then titrated with potassium iodate.

10c-19. Determination of Oxygen by the Vacuum Fusion Method. C. N. Rice. *U. S. Atomic Energy Commission,* MDDC-356; LADC-143, Oct. 5, 1944, 6 pages.

Changes made in the vacuum fusion method for oxygen determination. As a result of these changes it is possible to complete analyses of six uranium-metal samples in a 15-hour period.

10c-20. Analytical Chemistry of the Manhattan Project; Vanadium, Columbium, and Tantalum. S. W. Rasmussen and C. J. Rodden. *U. S. Atomic Energy Commission,* MDDC-373, Sept. 30, 1946, 8 pages.

Colorimetric, gravimetric, and volumetric methods of determination and separation. 36 ref.

10c-21. L'Ortho-Oxy-Phenylfluorone, Réactif Spéctifique Soit du Molybdene, Soit du Cuivre. (Ortho-Oxyphenylfluorone—A Specific Reagent for Both Molybdenum and Copper.) J. Gillis, A. Claeys, and J. Hoste. *Analytica Chimica Acta,* v. 1, Dec. 1947, p. 421-428.

Details of filter-paper qualitative method.

10c-22. Spectrochemical Determination of Nickel in Electrolytic Cobalt Using a Current-Regulated Direct-Current Arc. Clyde A. Bridger and Graham W. Marks. *Bureau of Mines, Report of Investigations* No. 4198, Feb. 1948, 7 pages.

Apparatus and methods used. 10 ref.

10c-23. A New Dry Test for Gold. R. C. Mehrotra. *Nature,* v. 161, Feb. 28, 1948, p. 321.

Gold salt in concentrated HCl was heated with a trace of metallic zinc in a porcelain dish. On dipping a test tube full of water in the solution then holding in the Bunsen flame, a green mantle forms. Sn and Cu interfere, but Hg, Pb, Ag, and Pt do not.

10c-24. Analysis of Cemented Carbide Compositions. W. O. Touhey and John C. Redmond. *Analytical Chemistry,* v. 20, March 1948, p. 202-206.

Procedure for complete analysis. Classical methods and published procedures leave much to be desired. The method is said to be more rapid and is shown to give good agreement on known mixtures. Procedures are also given for determination of individual elements.

10c-25. Analysis of Thorium-Chromium Mixtures. Richard E. Ewing and Charles V. Banks. *Analytical Chemistry,* v. 20, March 1948, p. 233-235.

Method described involves perchloric acid oxidation of Cr in the presence of Th, followed by titration with ferrous sulphate and tetrasulphatoceric acid. The Th is precipitated as the oxalate and de-

termined gravimetrically after removal of the Cr as chromyl chloride. 12 ref.

10c-26. Potentiometric Determination of Lead. Ladislaus Farkas and Norbert Uri. *Analytical Chemistry,* v. 20, March 1948, p. 236-237.

Determination by titration with alkali fluoride in the presence of alkali chloride (or bromide) is proposed. Equivalence point is determined by a drop in the ferric-ferrous oxidation-reduction potential.

10c-27. Colorimetric Determination of Traces of Gold. E. B. Sandell. *Analytical Chemistry,* v. 20, March 15, 1948, p. 253-256.

Trace quantities can be isolated by precipitation with stannous chloride, with Te as collector, and determined colorimetrically or photometrically with p-diethylaminobenzylidenerhodanine as reagent. As little as 0.1 parts per million can be determined when a 1-g. sample is taken. Large amounts of Fe, Cu, Pb, and As do not interfere.

10c-28. Determination of Silver With Ascorbic Acid. E. C. Stathis. *Analytical Chemistry,* v. 20, March 1948, p. 271.

Gravimetric method. Pb, Cu, Bi, Cd, Ni, and Zn show no interference. Satisfactory results have been obtained on Ag-Cu coin alloys

10c-29. Electrolytic and Polarographic Determination of Zinc in Thorium. James H. Patterson and Charles V. Banks. *U. S. Atomic Energy Commission,* MDDC-1708, Dec. 29, 1947, 13 pages.

Methods applicable to concentrations from 20 parts per million to 100% Zn. An electrolytic method is used for alloys that contain more than 1% Zn. For less than 1%, a polarographic method is used.

10c-30. Determination of Vanadium in Manganese Ore. Alfred Kundert. *Chemist Analyst,* v. 37, March 1948, p. 16-17.

A method for the separation of vanadium from solution. It was found that a complete precipitation was made by zinc oxide in the presence of sufficient iron to occlude the vanadium. When the iron content was at least twice that of the vanadium, no boiling was required.

10c-31. The Photometric Determination of Tungsten. C. H. R. Gentry and L. G. Sherrington. *Analyst,* v. 73, Feb. 1948, p. 57-67.

A precise procedure based upon reduction in HCl solution by tin amalgam and subsequent addition of thiocyanate. Conditions of acidity required for complete reduction, effect of thiocyanate concentration, conditions for stabilizing the reduced state, and optimum conditions of final acidity were systematically investigated. Interferences from diverse cations and anions, and instructions for the application of the method to typical steel and nonferrous metal analyses. 14 ref.

10c-32. The Determination of Oxide Lead in Ores and Concentrator Products. R. S. Young, A. Golledge, and H. L. Talbot. *Mining Technology,* v. 12, March 1948, T.P. 2303, 4 pages.

Method which overcomes the disadvantage of existing procedures wherein lead phosphates and vanadates are counted as sulphides. It consists in leaching first with ammonium acetate solution to dissolve sulphate, carbonate, and oxide, and extracting the residue with dilute perchloric acid. Lead phosphate and vanadates are soluble in the latter reagent, while lead sulphide is only attacked to a very slight degree.

10c-33. Polarographic Determination of Zinc in Metallic Cadmium After Preliminary Electrodeposition From Hydrochloric Acid Solution. (In Russian.) P. N. Kovalenko. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 2, Nov.-Dec. 1947, p. 334-340.

Preliminary separation of metallic Al and electrolysis using Al electrodes from HCl solutions at 200° C. After solution of metallic Cd is accomplished, most of it is deposited on a spiral of Al wire, and the remainder electrolyzed. After separation of Cd, the Zn is determined polarographically.

10c-34. The Color Reaction of Zinc With Methylviolet (Rhodanide). (In Russian.) V. I. Kuznetsov. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 2, Nov.-Dec. 1947, p. 373-376.

Effects of various factors on qualitative identification test.

10c-35. Colorimetric Microdetermination of Zirconium. David E. Green. *Analytical Chemistry,* v. 20, April 1948, p. 370-372.

Comprises development of an accurate method for clays or silicate rocks, using the pink lake formed by zirconium-alizarin-sulphonate complex. Method applies to a range of zirconium oxide content up to 0.275 mg. with an accuracy to 0.003 mg. of zirconium oxide. 10 ref.

10c-36. Inorganic Spot Test for Copper. Frieda Goldschmidt and Binyamin R. Dishon. *Analytical Chemistry,* v. 20, April 1948, p. 373-374.

Appearance of a violet color when

concentrated hydrobromic acid reacts with salts of divalent Cu is basis of test which requires only common inorganic reagents and has a sensitivity comparable to tests with organic reagents.

10c-37. The Determination of Palladium and Nickel With Alpha-Furidioxime. Sherman A. Reed and Charles V. Banks. *U. S. Atomic Energy Commission,* AECD-1819, March 9, 1948, 8 pages.

Under optimum conditions 1 part of Ni was easily detected in 6,000,000 parts of an aqueous solution while 1 part of Pd in 20,000,000 parts of an aqueous solution was readily detected. Use as a quantitative reagent for Ni was not found to be feasible.

10c-38. Rapid Colorimetric Determination of Copper in Tin-Base Alloys. George Norwitz. *Analytical Chemistry,* v. 20, May 1948, p. 469-470.

After the sample has been dissolved in hydrochloric and nitric acids, phosphoric acid is added and the solution is heated. Water and ammonia are added, and the resultant blue copper amine color is measured colorimetrically. Addition of phosphoric acid prevents precipitation of the tin when the solution is made ammoniacal.

10c-39. Organic Reagents for Uranium Analysis. Elinor Ware. *U. S. Atomic Energy Commission, MDDC* 1432, Aug. 1945, 20 pages.

Of the reagents studied, none combines exclusively with uranium. For colorimetric detection and determination, chromotropic acid and aluminon show the greatest sensitivity. Of the reagents that precipitate uranium quantitatively, 8- hydroxyquinoline seems unexcelled, although it is far from being an ideal reagent.

10c-40. Méthode de Titrage Semi-Electrométrique du Titane dans les Ferro-Titane. (Method of Semi-Electrometric Titration of Titanium in Ferro-Titanium.) Robert Lannet. *Revue de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 286-291.

A modified method, said to be more useful for industrial work and to require simpler apparatus.

10c-41. A Method for the Determination of Minute Amounts of Zinc in Alloys Used for Making Lead Pipes and Cable Sheathing. B. S. Evans. *Analyst,* v. 73, March 1948, p. 149-152.

Details of volumetric method developed which is satisfactory for amounts as small as 0.001%.

10c-42. The Quantitative Spectrographic Analysis of the Rare Earth Elements. Part III. Determination of Major Constituents in Complex Mixtures. Velmer A. Fassel and Harley A. Wilhelm. *U. S. Atomic Energy Commission, MDDC* 1777, March 3, 1948, 8 pages.

Determination of Yt and Gd in the concentration range of 10 to 100%. The procedures involve the high-current, d.c.-arc excitation of rare-earth oxide sample. 18 ref.

10c-43. Influence de la Valence du Rhenium sur son Spectre X d'Absorption. (Influence of the Valence of Rhenium on Its X-Ray Absorption Spectrum.) Iona Manescu. *Comptes Rendus* (France), v. 226, March 22, 1948, p. 1010-1012.

10c-44. Spectrochemical Determination of Copper In Copper-Zinc and in Copper-Nickel Alloys. William M. Spicer. *Analytical Chemistry,* v. 20, June 15, 1948, p. 557-558.

The method is suitable for Cu from 70 to 97% in Cu-Zn alloys and 90 to 99% in Cu-Ni alloys.

10c-45. Analysis of Simple and Complex Tungsten Carbides. John J. Furey and Thos. R. Cunningham. *Analytical Chemistry,* v. 20, June 15, 1948, p. 563-570.

Methods for separating and estimating the principal constituents.

10c-46. Spektrochemische Analyse fester Elecktroden, insbesondere von Nichteisenmetallen. (Spectrochemical Analysis of Solid Electrodes, Especially Those Made of Nonferrous Metals.) H. Moritz. *Archiv fur Metallkunde,* v. 1, March 1947, p. 109-114.

Practical application for qualitative and quantitative analysis, the latter especially for Zn and Zn alloys. 11 ref.

10c-47. Méthode de dosage du chrome dans les ferrochrome. (Method for Determination of Chromium in Ferrochromium.) Robert Lannet. *Revue de Métallurgie,* v. 44, Nov.-Dec. 1947, p. 380-381.

Method is characterized by the use of hot phosphoric acid to dissolve the sample. Titration of chromic acid is done by means of ferrous sulphate solution, using diphenylamine as indicator.

10c-48. Nouvelle réaction analytique du bismuth. (A New Analytical Reaction of Bismuth.) Marcel Jean. *Comptes Rendus* (France), v. 226, Jan. 5, 1948, p. 85-86.

Silicotungstic acid forms, in the presence of rubeanic acid, a white substance with bismuth ions. This precipitate turns brown when heated, the intensity of the color being proportional to the bismuth ion concentration.

10c-49. The Spectrographic Analysis of Tin and Tin-Lead Solders. D. M. Smith. *Tin Research Institute,* (England), 1948, 31 pages.

Present knowledge on the subject. Information on choice of equipment and suitable methods of analysis for specific purposes. 31 ref.

10c-50. The Quantitative Evaluation of Oxygen in Zirconium. W. C. Lilliendahl, D. M. Wroughton, and E. D. Gregory. *Journal of the Electrochemical Society,* v. 93, June 1948, p. 235-247.

Two methods used and particular advantage of each. Oxygen analyses of Zr from three sources. Microstructures of heat treated zirconium wires with and without added oxygen. Microhardness measurements on a series of oxygen-doped wires provide a correlation between oxygen content and hardness.

10c-51. A Practical Series of Precious Metal Sulphides. (In Russian.) G. A. Medvedeva. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, March-April 1948, p. 103-108.

Arranges the sulphides in a series according to there water solubility. By boiling a mixture of sulphides containing Ir, Rh, Pt, Ru, Os, Pd, and Au; the three latter elements can be precipitated, which fact is believed to be of importance from an analytical point of view.

10c-52. Quantitative Determination of Lead in the Presence of Cations of the Second Analytical Group. (In Russian.) V. P. Shvedov, E. O. Gol'dshtein, and N. I. Selemkova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, March-April 1948, p. 109-112.

Method for separation of lead in the form of its oxybromide or oxyiodide from larger amounts of Ba, Sr, Ca, and Mg. The possibility of quantitative lead determination after dissolution of the oxyhalide in a solution of ammonium acetate and the subsequent precipitation of lead in form of lead chromate. 10 ref.

10c-53. Potentiometric Titration of +4 and +6 Selenium and Tellurium with Chromous Ion. James J. Lingane and Leonard Niedrach. *Journal of the American Chemical Society,* v. 70, June 1948, p. 1997-2000. 13 ref.

10c-54. Rapid Spectrographic Analysis of Cemented Carbide Compositions. John C. Redmond. *Steel,* v. 122, June 28, 1948, p. 86-88.

Development of a satisfactory technique, which involves grinding of the sample to an average diameter of 1 to 2 microns. Operating conditions, working curves, and a comparison of chemical and spectrographic results.

10c-55. Rarer Elements in Qualitative Analysis: Tungsten. Ting-Ping Chao and Jen-Tsi Yang. *Journal of Chemical Education,* v. 25, July 1948, p. 388-389.

Need for supplementing the conventional scheme of qualitative analysis, which includes only 24 cations. Procedure for separation and identification of tungsten.

10c-56. The Chemical Analysis of a Permanent Magnet Alloy. C. H. R. Gentry. *Metallurgia,* v. 38, June 1948, p. 108-113.

Alloys contain 15-30% Co, 12-20% Ni, 5-10% Al, 2-7% Cu, 0-10% Ti, 0-1% Si, 0-0.2% Mn, and remainder Fe. Procedures for the determination of each constituent. Use of photometric and polarographic methods for the determination of elements present in high percentages. 15 ref.

10c-57. Some Recent Advances in Analytical Technique. R. Belcher. *Industrial Chemist and Chemical Manufacturer,* v. 24, June 1948, p. 400-402.

Methods of detection and determination for molybdenum and copper; organic sulphur; and for micro-titration of organic acids.

10c-58. Determination of Trace Impurities in High-Purity Magnesium and Calcium. Sydney Abbey. *Analytical Chemistry,* v. 20, July 1948, p. 630-634.

Sensitive photometric methods for trace impurities which have been applied to the analysis of high-purity magnesium, magnesium alloys, and calcium. Mn is determined as permanganic acid, following periodate oxidation; Fe as the thiocyanate complex; Ni as the tetravalent complex with dimethylglyoxime; Cu by CCl_4 extraction of the carbamate complex; and Si by reduction of silicomolybdate to molybdenum blue. 22 ref.

10c-59. 1,2-Cyclohexanedione Dioxime; Reagent for Palladium. Roger C. Voter, Charles V. Banks, and Harvey Diehl. *Analytical Chemistry,* v. 20, July 1948, p. 652-654.

Compound yields a yellow precipitate with divalent palladium which can be used as a qualitative and quantitative reagent for the palladium ion and offers several advantages over its analog, dimethylglyoxime.

10c-60. Rapid Shop Test for Zinc Die Casting Alloys. C. Goldberg. *Metal Progress,* v. 54, July 1948, p. 64.

Simple qualitative spot test.

10c-61. The Colorimetric Determination of Nickel As Ni Dimethylglyoxime. (In English.) K. Ter Haar and W. Westerveld. *Recueil des Travaux Chimiques des Pays-Bas,* v. 67, Feb. 1948, p. 71-81.

Method in which persulphate is used as an oxidizing agent. Effects of other metallic ions were determined. The method is extensively applied in the authors' laboratory to the determination of Ni in chromium-iron, and in Mo and W compounds.

10c-62. Investigation of the Influence of the Composition of the Sample on the Intensity of Spectral Lines During Spectrographic Analysis of Minerals. (In Russian.) S. A. Borovik and T. F. Borovik-Romanova. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R, Section of Chemical Sciences.), no. 2, March-April 1948, p. 161-164.

Results of investigations of the influence of Na and K salts on the intensity of lines of neutral and ionized atoms of Li, Rb, Ti, and V when different sources of exitation were used (d.c. and a.c. arcs, spark according to the Feisher method, and acetone flames).

10c-63. Neues Verfahren zur titrimetrischen Bestimmung des Mangan II- und des Cadmium Ions. (New Titrimetric Method of Determining Manganese II and Cadmium Ions.) Hugo Krause. *Zeitschrift fur Analytische Chemie,* v. 128, no. 1, 1947, p. 18-23.

The method of titrimetrically determining manganese II and cadmium ions by precipitating the compounds $NH_4MnPO_4 \cdot H_2O$ and $NH_4CdPO_4 \cdot H_2O$, respectively.

10c-64. Polarographic Determination of Zinc and Nickel in Aluminum Alloys. (In Russian.) Z. S. Mukhina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 522-527.

A method for determination of zinc, from 0.03 to 10% or more, in aluminum alloys. A 10% solution of ammonium chloride, sodium sulphide, and ammonia, with dextrin added for maximum suppression, is recommended.

10c-65. A New Variation of the Cyanic Method of the Determination of Molybdenum. (In Russian.) L. B. Ginzburt and U. U. Lurye. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 538-545.

A new variation of the cyanic method of photocolorimetric determination of molybdenum, with applications as a reducing agent for potassium iodide. This does not differ from the old method in application to stannous chloride, in respect to degree of sensitivity and range of colorimetry, but does differ in having a shorter period of coloration and in degree of stability.

10c-66. Determination of Iron, Silica, Copper, and Zinc in Aluminum by the Spectrographic Method. (In Russian.) L. V. Drutskaya. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 571-575.

The application of spectral analysis for the determination of metals listed. Apparatus used. Calibration curves for metals. This analysis assumes a maximum error of 12%.

10c-67. Direct Polarographic Determination of Copper and Lead in a Nickel Electrolyte. (In Russian.) I. A. Korshunov and L. N. Sazanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 621.

Polarographic determination of copper and lead in a nickel electrolyte previously treated with small amounts of hydrogen peroxide and sodium to destroy organic conditions and cause iron to precipitate.

10c-68. Polarographic Determination of Zinc in a Piston Alloy. (In Russian.) I. A. Korshunov and I. I. Malyugina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 622.

The main characteristic of the proposed method is the use of an alkaline solution, permitting the desired determination without aluminum separation.

10c-69. Un dosage colorimétrique du cuivre. (Colorimetric Determination of Copper.) D. Monnier, I. Pardova, and P. E. Wenger. *Analytica Chimica Acta,* v. 2, Feb. 1948, p. 30-35.

Method is based on the solution of anhydrous Cu_2Cl_2 in potassium thiocyanate in acetone, followed by spectrophotometric measurement of the intensity of color of the red complex formed.

10c-70. Colorimetric Determination of Copper With the Aid of Dimethylglyoxime. (In Russian.) V. M. Peshkova, M. E. Lebontin, and K. I. Litein. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, May-June 1948, p. 161-166.

The methods of Goethals and of Clarke and Jones were studied. Certain modifications of the latter were developed, resulting in more stable coloration. The nature of the reaction was studied.

10c-71. Nioxime—A Reagent for Nickel. Roger C. Voter, Charles V. Banks, and Harvey Diehl. *U. S. Atomic Ener-*

gy Commission, MDDC-985, May 29, 1947, 8 pages.

Procedure for the gravimetric determination of nickel and palladium with the compound 1, 2-cyclohexanedionedioxime which is similar to dimethylglyoxime.

10c-72. Colorimetric Determination of Copper With Carbon Disulfide and Diethanolamine. Warren C. Woelfel. *Analytical Chemistry,* v. 20, Aug. 13, 1948, p. 722-724.

A reagent prepared from carbon disulphide and diethanolamine reacts with the cupric ion to form a brownish-yellow salt of bis (2-hydroxyethyl) dithiocarbamic acid. The reaction has been made the basis of a colorimetric method for the determination of copper.

10c-73. Determination of Lead in Air. L. J. Snyder, W. R. Barnes, and J. V. Tokos. *Analytical Chemistry,* v. 20, Aug. 13, 1948, p. 772-776.

To aid in rapidly detecting and avoiding dangerous concentrations of tetraethyl lead in air, a field micro-method was developed, which requires approximately 10 min. and is accurate to better than 1 microgram of lead per cu. ft. of air.

10c-74. Dosage entierement automatique de quelques alliages d'argent et de cuivre. (Completely Automatic Analysis of Certain Alloys, of Silver and Copper.) Simonne Peltier and Clement Duval. *Comptes Rendus,* v. 226, May 24, 1948, p. 1727-1729.

How the Chevenard thermobalance may be used for quantitative analysis of the above, without weighing or separation of the constituents, by merely measuring two lines recorded on photographic paper.

10c-75. Polarographic Characteristics of +2 and +3 Vanadium. I. Polarography in Non-Complexing Solutions. James J. Lingane and Louis Meites. *Journal of the American Chemical Society,* v. 70, July 1948, p. 2525-2529.

Polarographic characteristics were studied in a wide variety of media, including dilute acids and alkalies, phosphate, acetate pyridine, and carbonate buffers, and solutions of the halides, thiocyanate, cyanide, thiosulphate, pyrophosphate, borate, benzoate, phthalate, salicylate, tartrate, and citrate. Only the cases in which no complex ions are formed.

10c-76. The Reduction of Antimony Solutions with Metallic Nickel. H. Holness. *Journal of the Society of Chemical Industry,* v. 67, June 1948, p. 238-241.

Optimum conditions were established, as used in volumetric determination of Sn in Sb-rich alloys. Experiments using sheet nickel in place of powder, and an explanation offered for some of the phenomena observed.

10c-77. The Volumetric Determination of Tin on a Small Scale and Its Application to Non-Ferrous Alloys. Christina C. Miller and Leslie R. Currie. *Analyst,* v. 73, July 1948, p. 377-380.

Method for volumetric determination of 0.1 to 1 mg. of tin. Stannic chloride is reduced by boiling it vigorously under reflux with 40% HCl in the presence of sticks of freshly recast antimony, and the stannous chloride formed is titrated with 0.1 *N* iodine. The method has been applied to the determination of tin in bearing metals, a fusible alloy, an Al alloy, and brasses and bronzes. 10 ref.

10c-78. Sur la thermogravimétrie des précipités analytiques. XII. Dosage du Césium. Thérese Duval and Clément Duval. **XIII. Dosage du Thallium.** Simonne Peltier and Clément Duval. **XIV. Dosage du Lanthane. XV. Dosage du Cérium. XVI. Dosage du Néodyme. XVII. Dosage du Samarium.** Thérese Duval and Clément Duval. (Thermogravimetric Analysis of Precipitates. XII. Determination of Cesium. XIII. Determination of Thallium. XIV. Determination of Lanthanum. XV. Determination of Cerium. XVI. Determination of Neodymium. XVII. Determination of Samarium.) *Analytica Chimica Acta,* v. 2, July 1948, p. 205-229.

Continues series of articles describing behavior of various gravimetric precipitates during drying as determined using the Chevenard thermobalance. Temperature limits for drying. 17 ref.

10c-79. The Precipitation of Germanium by Tannin. (In English.) H. Holness. *Analytica Chimica Acta,* v. 2, July 1948, p. 254-260.

Germanium was quantitatively precipitated from oxalate solution. Clean separations were effected in one precipitation from vanadium, ferric iron, and elements of tannin Group B.

10c-80. The Chromatographic Separation of Antimony. (In English.) Michael Lederer. *Analytica Chimica Acta,* v. 2, July 1948, p. 261-262.

Trivalent antimony was satisfactorily separated by filter-paper partition chromatography from all common metallic ions.

10c-81. Analytical Methods For Ruthenium. R. Thiers, W. Graydon, and F. E. Beamish. *Analytical Chemistry,* v. 20, Sept. 1948, p. 831-837.

The distribution of ruthenium losses during fire-assay procedures was determined. Significant retention of ruthenium by the slag and cupel occurs. Losses as the volatile tetroxide during fusion and partial cupellation are negligible. A new procedure for parting the button and treating the residues. 41 ref.

10c-82. Sensibilité de detection du rhénium par diffraction de poudre cristalline. (Sensitivity of Detection of Rhenium by X-Ray Powder Diffraction.) Annette Prévot. *Comptes Rendus,* v. 226, June 28, 1948, p. 2136-2138.

Method said to be 10 times as sensitive for pure rhenium and 100 times for mixtures as methods commonly used.

10c-83. Rapid Method for Analysis of Tungsten and Molybdenum Alloys. (In Russian.) V. G. Goryushiva and T. V. Cherkashina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 873-874.

Details of a potentiometric-titration method for determination of W and Mo in alloys containing large percentages of these elements.

10c-84. Titanium; Polarographic Determination in Clays and Clay Products. Donald F. Adams. *Analytical Chemistry,* v. 20, Oct. 1948, p. 891-895.

Effects of various factors.

10c-85. Electrolytic and Polarographic Determination of Zinc in Thorium. James H. Patterson and Charles V. Banks. *Analytical Chemistry,* v. 20, Oct. 1948, p. 897-900.

Previously abstracted from *U. S. Atomic Energy Commission,* MDDC-1708, Dec. 29, 1947. See item 10c-29, 1948.

10c-86. Precision Determination of Lead in High Grade Copper; Dithizone Color and Electrodeposition Gravimetric Methods. Louis Silverman. *Analytical Chemistry,* v. 20, Oct. 1948, p. 906-909.

Techniques used. 11 ref.

10c-87. Analysis of Cemented Carbide Compositions. *Analytical Chemistry,* v. 20, Oct. 1948, p. 989.

W. C. Bowden reports disagreement between procedure described by W. O. Touhey and J. C. Redmond (v. 20, 1948, p. 202-206) and his analytical results obtained on cemented-carbide alloys. The latter authors reply to the points raised; and, as a result of further experiments, modify their original procedure.

10c-88. Colorimetric Determination of Small Quantities of Antimony in Copper and Tin Bronzes. (In Russian.) E. I. Nikitina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 933-935.

Method is based on determination of the yellow complex $KSbI_4$ in H_2SO_4 solution in the presence of ascorbic acid.

10c-89. The Determination of Zinc in the Presence of Uranium. J. R. McCoy and S. M. Tuthill. *U. S. Atomic Energy Commission,* AECD-2180, 1947, 11 pages.

A procedure for determining zinc in uranium tetrafluoride and in pitchblende by means of dithizone. With this procedure it is possible to determine as little as one microgram of zinc. The procedure includes a method for the elimination of nickel and lead.

10c-90. Application of Aromatic Compounds of Arsenic in Chemical Analysis. I. (no subtitle.) II. Arsonate Method for Determination of Cobalt. III. Determination of Lead in the Presence of Alkaline-Earth Metals. (In Russian.) A. I. Portnov. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 18(80), April 1948, p. 594-607.

Dissociation constants of several of the compounds were determined, including effects of substituents. 29 ref.

10c-91. A Study of Some Chemical Reactions Employed in Photometric Analysis. H. C. Davis and A. Bacon. *Journal of the Society of Chemical Industry,* v. 67, Aug. 1948, p. 316-331.

A number of the chemical reactions employed in photometric analysis for the determination of Si, Mn, Cr, Ni, V, Ti, Cu, Fe, and Mo. The influence of a large number of variables was studied in order to establish optimum conditions.

10c-92. The Influence of Basicity Upon the Efficiency of Oxidation/Hydrolysis Procedures for the Separation and Purification of Cerium. R. C. Vickery. *Journal of the Society of Chemical Industry,* v. 67, Aug. 1948, p. 333-336.

Results of a study of several methods. 10 ref.

10c-93. Le dosage electrolytique du thallium. (Electrolytic Determination of Thallium.) M. J. Besson. *Bulletin de la Société Chimique de France,* July-Aug. 1948, p. 739.

A short critical note.

10c-94. Filter Paper Pellets in the Spectrochemical Analysis of Solutions. N. S. Bayliss and D. J. David. *Journal of the Society of Chemical Industry,* v. 67, Sept. 1948, p. 357-358.

Use of pellets of compressed filter-paper pulp as a supporting med-

ium for solutions in spectrochemical analysis for graphite and copper-arc methods. The sensitivity and reproducibility of the method for B, Cu, Mn, Mo, Na, and Pb.

10c-95. Spectrophotometric Determination of Dichromates in Saturated Solutions of Chromates and Dichromates. Eric W. Martin, A. Norman Hixson, and Wallace M. McNabb. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1043-1045.

Method which was developed for use in connection with a process for the recovery of soluble chromates from ores. 11 ref.

10c-96. Chemistry of Thorium; Quantitative Estimation of Thorium by a Titrimetric Iodate Procedure. Therald Moeller and Nancy Downs Fritz. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1055-1058.

Although lacking in absolute accuracy, the procedure gives results comparable with those obtained by accepted procedures and is much more rapid.

10c-97. Colorimetric Determination of Gold as Bromoaurate; Separation of Small Amounts of Gold by Solvents Extraction. W. A. E. McBryde and John H. Yoe. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1094-1099.

Color formation is immediate and permanent in solutions with pH less than 4, if a large excess of chloride is avoided. Sensitivity compares favorably with existing procedures. Small amounts of gold may be extracted from 2 M HBr solutions with isopropyl ether, thereby effecting separation from other metals with colored ions. 25 ref.

10c-98. Controlled Procedures Effect Quantity Production of Reclaimed Copper Base Alloys. A. E. St. John. *Steel,* v. 123, Nov. 29, 1948, p. 76-78, 104.

Modern assaying practice which controls sorting, furnace charging, melting, refining, and casting.

10c-99. The Determination of Silicon in Nickel Alloys. J. T. Minster. *Analyst,* v. 73, Sept. 1948, p. 507.

The colorimetric method for its determination.

10c-100. Essais des matériaux dans l'industrie metallurgique. (Testing of Materials in the Metallurgical Industry.) (Also in German.) A. Meyer. *Pro-Metal,* v. 1, July, 1948, p. 116-124, 137-141.

Methods for quantitative volumetric and gravimetric analysis of copper alloys are discussed with emphasis on determination of Cu, Zn, Sn, Pb, and Fe in bronzes and brasses. (To be continued.)

10c-101. Spectrographic Analysis of Permalloys. (In Russian.) A. V. Borsova and N. N. Sorokina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1098-1100.

Proposes improved method with emphasis on determination of Ni and Mo.

10c-102. Analysis of Alloys Containing Mainly Chromium and Cobalt. (In Russian.) G. I. Zhuravlev and P. N. Tereshchenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1101-1105.

According to the complete analytical procedure, Ni, Mo, Mn, Fe, and Si are determined spectrographically and Cr, C, and S chemically.

10c-103. Paper Chromatography of the Noble Metals. Michael Lederer. *Nature,* v. 162, Nov. 13, 1948, p. 776-777.

Separation of Au, Pt, Pd, Cu, and Ag. Advantages.

10c-104. Iron in Brass and Bronze; Rapid Colorimetric Determination. Milton Sherman. *American Foundryman,* v. 14, Dec. 1948, p. 55-56.

The literature was surveyed prior to a systematic study of the use of thioglycollic acid. Procedure, results of typical analyses of standard samples, and effects of various cations and anions.

10c-105. Spectrographic Analysis in the Manufacture of Brass and Bronze Ingots. G. E. Staahl and G. P. Halliwell. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 191-197; discussion, p. 198-199.

Previously abstracted from *American Foundryman,* v. 12, Sept. 1947, p. 51-57. See item 10-168, 1947. Also appeared as preprint No. 47-47, 1947.

10d—Lightweight-Base Metals

10d-1. Polarographic Determination of Lead in Aluminum Alloys. William Stross. *Metallurgia,* v. 37, Nov. 1947, p. 49-51.

Rapid and simple method based on work by Kolthoff and Matsuyama, which is applicable to lead contents from less than 0.05 to approximately 3%. The metal is dissolved by HCl. Interference of tin is prevented by oxidation, that of iron by reduction at controlled pH, and copper is precipitated.

10d-2. An Investigation Into Factors Affecting the Sodium Carbonate Fusion of Beryl. G. H. Osborn. *Analyst,* v. 72, Nov. 1947, p. 475-478.

Used in the analysis of beryl for beryllium. 13 ref.

10d-3. Micro-Spectrochemistry of Aluminum Alloys. D. P. Jensen. *Iron Age,* v. 161, Jan. 8, 1948, p. 66-68.

An interesting application is a procedure for studying diffusion in clad aluminum alloy sheet at thickness intervals of about 0.001 in., commencing 0.001 in. from the surface. Simple, rapid, and accurate, the method can be readily performed with standard spectrographic equipment.

10d-4. Die Spektrographische Betriebsanalyse von Aluminium und Seinem Legierungen. (Spectrographic Analysis of Aluminum and Its Alloys.) G. Winkler. *Chimia,* v. 1, Dec. 15, 1947, p. 248-252.

Four methods. Numerous references to U.S. work.

10d-5. Determination of Small Amounts of Beryllium by Fluorescence Measurement. A. B. Carlson, W. F. Neuman, and A. L. Underwood. *Atomic Energy Commission,* MDDC 941, Feb. 1947, 13 pages.

The fluorescence of alkaline beryllium solutions with quinizarin was studied; pH, dye concentration, and many common ions were shown to influence the fluorescence of the complex. An analytical procedure was developed for 1 to 10 micrograms of Be. The method can probably be extended to even smaller amounts.

10d-6. Determination of Magnesium Powder. (In Russian). V. I. Chugunova and A. P. Ivanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1163-1164.

Direct method based on solution of MgO by 5% CrO_2, which does not react with metallic Mg.

10d-7. Acidimetric Determination of Aluminum. A. H. Bushey. *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 169-172.

A caustic solution of aluminate is titrated with HCl from a pH of approximately 11 to 3. The point at which free caustic is neutralized and the reaction with aluminate starts is identified by potentiometric measurements. The end point at which conversion of aluminum to the chloride is complete is identified visually and also indirectly by an application of Scott's method with potassium fluoride. Accuracy and precision are discussed, as well as effect of interfering substances.

10d-8. Phosphoric Acid Attack Method for Determination of Silicon in Aluminum Alloys. George Norwitz. *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 182.

Method claimed to be an improvement upon the one described by Lisan and Katz (v. 19, 1947, p. 252).

10d-9. A New Colorimetric Method for Determining Traces of Beryllium. A. L. Underwood. *U. S. Atomic Energy Commission,* MDDC-1569, Sept. 1, 1947, 12 pages.

Colorimetric method for amounts of 0.2 to 8 micrograms. Effects of pH, dye concentration, time of standing, heating, and several common ions. Accuracy is quite satisfactory.

10d-10. A Study of the Reaction Between Beryllium and Aurin Tricarboxylic Acid. George E. Kosel and William F. Neuman. *U. S. Atomic Energy Commission,* MDDC-1665, Jan. 29, 1948, 13 pages.

Reaction was studied spectrophotometrically. From these studies, a procedure was developed for the determination of beryllium in 1 to 10 microgram amounts.

10d-11. Determination of Aluminum in Nitralloy G. Louis Silverman. *Chemist Analyst,* v. 37, March 1948, p. 11, 14.

A previous paper by the author described a convenient method in which Al was separated from Cr and from Fe by use of 8-hydroxyquinoline. It is now shown that Cr may be volatilized as CrO_2Cl_2, thus reducing the time of operation considerably. Further, in the separation of Fe from Al, citric acid but not tartaric acid may be used.

10d-12. Improved Gravimetric Determination of Silicon in Aluminum Alloys, Developed in Germany During the War. W. Stross. *Metallurgia,* v. 38, May 1948, p. 63-65.

Method, which is based on the mutual flocculation of gelatine and silicic acid, was tested and found to be a definite improvement on existing gravimetric procedures. 24 ref.

10d-13. Precipitation of Oxalates From Homogeneous Solution; Application to Separation and Volumetric Determination of Magnesium. Louis Gordon and Earle R. Caley. *Analytical Chemistry,* v. 20, June 15, 1948, p. 560-563.

Improved precipitation technique, by use of which the indirect method for determination of Mo based upon the solution of Mg oxalate in dilute H_2SO_4 and titration of the released oxalic acid becomes a very convenient and simple procedure.

10d-14. Zur Frage der Herstellung von Eich-(Leit-) Proben fur die spectrochemische Analyse von Aluminiumlegierungen. (Producing Standards for the Spectrochemical Analysis of Aluminum Alloys.) H. Moritz. *Archiv fur Metallkunde,* v. 1, March 1947, p. 124-125.

Critical survey of the production

of standard specimens used in the analysis.

10d-15. Probenahme und Herstellung von Elektroden zur raschen und sicheren spektrochemischen Ermittlung der Chargendurchschnittsgehalte bei Aluminium-Umschmelzlegierungen aus Gussblöckchen (Masseln) und Grossraummischern. (Sampling and Production of Electrodes for Rapid and Reliable Spectrochemical Analysis of Samples of Scrap Aluminum Alloys From Pigs and Large Mixing Vessels.) H. Moritz. *Archiv fur Metallkunde,* v. 1, March 1947, p. 125-137.

Advantages and disadvantages of spectrochemical analysis in investigation of the distribution of alloying elements within the scrap, determination of a suitable sample, and a rapid method for compounding the charge. Test samples from the mixer were analyzed to determine the degree of uniformity of mixing.

10d-16. Spektrochemische Bestimmung des Calciums in Magnesium-Legierungen. (Spectrochemical Determination of Calcium in Magnesium Alloys.) Muller-Uri. *Archiv fur Metallkunde,* v. 1, March 1947, p. 137-138.

Recommended procedures for both the glass and the quartz spectrograph.

10d-17. Quantitative Spektralanalysen an dunnwandigen Leichtmetallproben. (Quantitative Spectral Analysis of Thin Samples of Light Metals.) Muller-Uri. *Archiv fur Metallkunde,* v. 1, March 1947, p. 138-139.

Tools and methods for inserting thin sheets of light metal into an electrode mold.

10d-18. Méthodes d 'analyse de l 'aluminum. (Methods of Aluminum Analyses.) *Revue de L 'Aluminium,* v. 25, June 1948, p. 196-200.

Latest standard procedures for sample preparation and for accurate determination of Si, Fe, Cu, Mn, Mg and Zn in Al are presented. (To be continued.)

10d-19. Rapid Volumetric Method of Determination of Magnesium in Aluminum Alloys. (In Russian.) R. B. Glushkina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 624.

For the determination of magnesium without preliminary separation of manganese, the author proposes the use of citric acid, which shoots into the stable complex the ions of aluminum, iron, and manganese. The ions of magnesium do not produce a complex with citric acid and could be precipitated with ammonium hypophosphate.

10d-20. Rapid Determination of Small Amounts of Silicon in Magnesium Alloys. D. F. Phillips and S. E. Hermon. *Metallurgia,* v. 38, July 1948, p. 179-180.

A method for the gravimetric estimation of small amounts of silicon in aluminum alloys. This is adapted to the satisfactory determination of the same element in magnesium alloys.

10d-21. Sur la thermogravimétric des précipités analytiques. V. Dosage du magnésium. VI. Dosage du glucinium (beryllium.). VII. Dosage du lithium. (Concerning the Gravimetric Behavior of Analytical Precipitates on Heating. V. Determination of Magnesium. VI. Determination of Glucinium (Beryllium). VII. Determination of Lithium.) Thérese Duval and Clément Duval. *Analytica Chimica Acta,* v. 2, Feb. 1948, p. 45-59.

In Part V, results of a study by means of the Chevenard thermobalance of a series of compounds which have been proposed for gravimetric analysis. In Part VI, the same apparatus was used for study of four beryllium compounds. Preference for the pyrophosphate is indicated. Also recommends heating to 951° only, instead of to 1200° C. In Part VII, four precipitates commonly used for lithium determination were studied. Temperatures recommended for heating each salt are given.

10d-22. On the Detection of Aluminum by Means of Aluminon (In English.) C. J. Van Nieuwenburg and G. Uitenbroek. *Analytica Chimica Acta,* v. 2, Feb. 1948, p. 88-91.

The reaction of aluminum with aluminon was modified in order to make it specific. This was accomplished by adding H_2SO_3 beforehand and C_2H_5OH and HCl afterwards. The first reagent prevents the interference of Cr, In, Ga, and Ti; the second that of Be, Sc, Zr, and small amounts of ferric iron.

10d-23. Sur la thermogravimétrie des précipités analytiques. VIII. Dosage du sodium. IX. Dosage de l' ammonium. X. Dosage du potassium. XI. Dosage du rubidium. (Concerning the Gravimetric Behavior of Analytical Precipitates on Heating. VIII. Determination of Sodium. IX. Determination of Ammonium. X. Determination of Potassium. XI. Determination of Rubidium.) Thérese Duval and Clément Duval. *Analytica Chimica Acta,* v. 2, April 1948, p. 97-114.

Chevenard-thermobalance pyrolysis curves for series of compounds commonly used for gravimetric determination of the above ions. Rec-

ommendations for modifications of existing methods.

10d-24. Dosage des traces de gallium dans les bauxites et produits dérivés. (Determination of Traces of Gallium in Bauxites and Its Products.) S. Lacroix. *Analytica Chimica Acta,* v. 2, April 1948, p. 167-173.

The gallium is estimated fluorimetrically in chloroform solution as the oximate. Interfering ions and means of their removal were studied.

10d-25. Microdetermination of Zinc in Aluminum Alloys. D. F. Phillips and L. J. Holton. *Metallurgia,* v. 38, Aug. 1948, p. 237-239.

A recent paper by Townend and Whalley (June 1947 issue) describes a composite scheme for the microdetermination of Cu, Ni, Fe, Si, Ti, and Mn in Al alloys, using absorptiometric procedures. The method described uses an aliquot from the solution remaining after determination of the above elements.

10d-26. Méthodes d'analyse de l'aluminium. Le dosage du cuivre. Le dosage du magnésium. (Methods for Analysis of Aluminum. Determination of Copper. Determination of Magnesium.) *Revue de l'Aluminium,* v. 25, Sept. 1948, p. 277-278.

Two electrolytic methods for copper and a gravimetric method for magnesium. (To be continued.)

10d-27. Konduktometrische Mikrobestimmung von Kohlenstoff, insbesondere zur Ermittlung seines Gehaltes in Aluminium. (Conductometric Microdetermination of Carbon, Particularly the Determination of Its Content in Aluminum.) H. R. Bolliger and W. D. Treadwell. *Helvetica Chimica Acta,* v. 31, Aug. 2, 1948, p. 1247-1259.

The method depends upon combustion in circulating oxygen. The CO_2 formed is conductometrically determined after absorption in aqueous NaOH, with an accuracy of $\pm 0.5\gamma$ of C.

10d-28. Dosage spectrophotométrique du magnésium. (Spectrophotometric Determination of Magnesium.) Y. Rusconi, D. Monnier, and P. E. Wenger. *Helvetica Chimica Acta,* v. 31, Oct. 15, 1948, p. 1549-1552.

Magneson (p-nitrobenzene-azo-resorcinol) is utilized as the color-producing reagent. A precision of 1% is obtained for amounts as low as 2 to 10 mg. of magnesium. Limits of application are 0.02 to 0.16 g. per liter. The effect of Zn and Al.

SECTION XI

APPARATUS, INSTRUMENTS AND METHODS

11-1. The Vapor Pressure of Metals. Rudolf Speiser. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 12-20.

Experimental techniques; Langmuir's rate-of-evaporation method, Knudsen's rate-of-effusion method; equipment used. Determination of the accommodation coefficients of beryllium and graphite and the thermodynamics of the equilibrium between solid and gaseous beryllium.

11-2. Symposium on Statistical Methods in Experimental and Industrial Chemistry. B. L. Clarke. *Analytical Chemistry,* v. 19, Dec. 1947, p. 943-955; discussion, p. 956-960.

Introductory Remarks, by B. L. Clarke; The Management Viewpoint, by George F. Smith; Technique for Testing the Accuracy of Analytical Data, by W. J. Youden; Design of Experiments in Industrial Research, by Hugh M. Smallwood; Statistical Training for Industry, by S. S. Wilks; prepared discussions by John W. Tukey, C. West Churchman, Grant Wernimont, and John Mandel. 15 ref.

11-3. Control of the Accuracy and Precision of Industrial Tests and Analyses. James A. Mitchell. *Analytical Chemistry,* v. 19, Dec. 1947, p. 961-967.

The control-chart procedure and its application; examples of its use in controlling the accuracy and precision of production chemical tests and analyses. (Presented at 11th Meeting of American Chemical Society, Atlantic City, N. J.)

11-4. A Transparent-Replica Technique for Interferometry. R. C. Faust and S. Tolansky. *Proceedings of the Physical Society,* v. 59, Nov. 1, 1947, p. 951-957.

A transparent-replica technique which allows the surface of an opaque body to be examined interferometrically using the transmitted multiple-beam fringe pattern. A replica made from methyl methacrylate polymer is found to reproduce features both in extension and in depth to within close limits. The technique was tested and applied to the examination of a coarsely polished metal surface. Further possibilities in examination of the surfaces of polished metals.

11-5. Testing Anodic Coatings. *Metal Industry,* v. 71, Dec. 19, 1947, p. 505.

Methods used for oxide coatings on aluminum alloys; measurement of thickness by the filmeter as described by Mason and Cochran, *ASTM Bulletin,* Oct. 1947.

11-6. Electronic Counters Return First Cost in Seven Months. *Factory Management and Maintenance,* v. 106, Jan. 1948, p. 71.

Use of the above to measure the output of 34 forging presses.

11-7. Taper-Setting Instrument Uses Resistance Strain Gages. George N. Levesque and Harold S. Sizer. *Electrical Manufacturing,* v. 41, Jan. 1948, p. 101-103, 184.

Position of the pivoted table on a universal cylindrical grinding machine is accurately set by correcting measured error in trial setting through use of extremely precise electric gages.

11-8. Magnetic "Texture Meter". (In Russian.) K. V. Grigorov. *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1073-1079.

Method and equipment developed for determining variations from the desired crystal structure in sheet steel based on variations in the magnetic anisotropy. Theoretical basis of the method; results of typical tests.

11-9. Investigation of the Structure of Steel by Means of Analysis of Oscillograms. (In Russian.) K. M. Bol'shova. *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1079-1086.

The work was undertaken because of the need for closer standardization in the heat treatment of tool steel. The method is applicable mainly to the surface layer, and was proposed by N. C. Akulov in 1934.

11-10. Determination of the Number of Grains per Unit of Volume in Alloys. (In Russian.) S. A. Saltykov. *Zavodskaya Laboratoriya (Factory Laboratory)*, v 13, Sept. 1947, p. 1086-1095.

Existing methods; improvements developed in the U.S.S.R.; practical applications on an industrial scale.

11-11. Means for Preparation of Microsections of Alloys Which Oxidize Rapidly. (In Russian.) E. A. Boom. *Zavodskaya Laboratoriya (Factory Laboratory)*, v. 13, Sept. 1947, p. 1139-1140.

A method suitable for alloys in which one of the components is an alkali or alkaline-earth metal, and especially suitable for Li-Si alloys containing 50 to 70% Si.

11-12. Use of Bauman's Method for Demonstrating the Heterogeneity of Structure of Cast Iron. (In Russian.) M. A. Shapiro. *Zavodskaya Laboratoriya (Factory Laboratory)*, v. 13, Sept. 1947, p. 1140-1141.

The above method, which has been widely applied to steels, was also found to be useful for determining the location and type of inclusions and other inhomogeneities in centrifugally cast engine cylinders. Its applicability for other cast iron parts.

11-13. Control of the Quality of Surfaces by a Printing Method. (In Russian.) N. M. Ziuskin. *Zavodskaya Laboratoriya (Factory Laboratory)*, v. 13, Sept. 1947, p. 1143-1145.

A system for photographing flaws and irregularities in surfaces, especially in cramped locations, such as inside gun barrels.

11-14. Mechanical Tensometer for Determination of Deformation in Bodies During Temperature Changes. (In Russian.) N. N. Prokhorov, N. V. Shiganov, and A. V. Mordvintseva. *Zavodskaya Laboratoriya (Factory Laboratory)*, v. 13, Sept. 1947, p. 1148-1149.

Apparatus described and diagrammed; typical results obtained.

11-15. Electron Optics. G. I. Finch and H. Wilman. *Science Progress*, Jan. 1948, p. 1-12.

Principles, methods, and applications of electron microscopy.

11-16. Some Applications of Electronics in Metrology. E. J. B. Willey. *Science Progress*, Jan. 1948, p. 55-65.

A review of applications to precise measuring devices. 21 ref.

11-17. Instrumentation. Ralph H. Munch. *Industrial and Engineering Chemistry*, v. 40, Jan. 1948, p. 83A-84A.

A new type of pneumatic actuator and a new thermocouple for use in reducing atmospheres.

11-18. Progress in Industrial Control Through Electrical Instrumentation. J. C. Mouzon. *Engineers' Digest* (American Edition), v. 4, Dec. 1947, p. 546.

Recent developments.

11-19. Vacuum Furnace for Laboratory Use. R. Kiessling. *Engineers' Digest* (American Edition), v. 4, Dec. 1947, p. 578-579. Translated and condensed from *Teknisk Tidskrift*, v. 77, no. 32, 1947, p. 586-587.

The furnace is suitable for temperatures up to 2200° C. It is heated by passing 200 to 500 amp. a.c. current through a graphite tube. It was used for investigation of the Cr-B and Ni-B systems, as well as for many other purposes.

11-20. Ultra High-Frequency Sound Waves Measure Thickness of Metal From One Side. Norman G. Branson. *Oil and Gas Journal*, v. 46, Jan. 22, 1948, p. 66, 69, 71.

Principles and applications of the "Audigage".

11-21. Electrical Conductivity Tests Facilitated by Improved Fixture. *Steel*, v. 122, Feb. 2, 1948, p. 112.

At General Electric's Fort Wayne works, rotors for small induction motors are pressure cast of aluminum. Control of conductivity of aluminum is an important factor in the manufacture of high-quality motors. An improved fixture.

11-22. Torque and Thrust Measurement Aid Bearing Testing. *Steel*, v. 122, Feb. 2, 1948, p. 119.

Instrument called "Thrustorq" is so sensitive and accurate that it will measure the reactive force of a single turbine blade or the thrust of a giant jet engine.

11-23. Laboratory Handling of Radioactive Material. Paul C. Tompkins. *Atomic Energy Commission*, MDDC-1414, Oct. 22, 1947, 26 pages.

Recommended techniques and tools.

11-24. Concave Metallic Replica Gratings. I. Simon. *Review of Scientific Instruments*, v. 18, Dec. 1947, p. 894-896.

Method is described for producing metallic replicas from gratings by electrodeposition of copper. It is possible to obtain concave replicas from a convex original grating—either metallic or glass.

11-25. An Electronic Analytical Balance. John W. Clark. *Review of Scientific Instruments*, v. 18, Dec. 1947, p. 915-918.

An electronic instrument which will weigh small objects with precision comparable to that of the chemical beam balance. It is faster to use and requires less skill on the

part of the operator than does the mechanical balance.

11-26. Sample Holder for Reflection Type Samples to Be Used in the G. E. Electron Diffraction Instrument. Eileen I. Alessandrini. *Review of Scientific Instruments,* v. 19, Jan. 1948, p. 52-53.

Holder makes it possible to photograph five different samples without having to break the vacuum each time a new specimen is to be examined.

11-27. Single Crystals; Methods of Production—Correction of Imperfections. *Metal Industry,* v. 72, Jan. 23, 1948, p. 71, 73.

Work which has been done with single crystals as an aid to metallurgical research.

11-28. Basic Principles and Application of X-Ray Crystallography. Stanley Siegel. *Frontier,* Dec. 1947, p. 15-19.

11-29. Adherence of Porcelain Enamel to Base Metal Measured by New Testing Apparatus Using Magnetic Counting Principle. *Steel,* v. 122, Feb. 16, 1948, p. 112. Also **Testing Instrument Measures Porcelain Enamel Adherency by Magnetic Counting,** *Products Finishing,* v. 12, Feb. 1948, p. 90.

Instrument developed by the Research Foundation of the Porcelain Enamel Institute in the National Bureau of Standards.

11-30. Metallography of Hot-Dipped Galvanized Coatings. D. H. Rowland. *Western Machinery and Steel World,* v. 39, Jan. 1948, p. 88-89, 110. A condensed version.

Previously abstracted from Preprint No. 18, 1947, American Society for Metals, Cleveland. See item 11-128, R.M.L., v. 4, 1947.

11-31. X-Ray Determination of Retained Austenite by Integrated Intensities. B. L. Averbach and M. Cohen. *Metals Technology,* v. 15, Feb. 1948, T.P. 2342, 14 pages.

An X-ray method based on integrated intensities developed for determination of retained austenite in hardened steels. No external calibration or standard reference foil is necessary and the procedure can be applied to steels in the as-hardened condition prior to any tempering treatment. Comparison of results with those obtained by lineal analysis indicate that those obtained by the latter procedure tend to be on the low side, even though unusual precautions are taken, when dealing with the range under 15% retained austenite. 16 ref.

11-32 Plastic Replicas for Surface-Finish Measurement. J. Pearson and M. R. Hopkins. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 138.

The methods hitherto described are said to be unsuitable for roughness measurements by stylus instruments. The technique outlined is of more general applicability, as it requires no heating and can be used to make negative surface replicas from objects of any size, roughness, or location.

11-33. Supersonic Flaw Detectors. Donald C. Erdman. *Electrical Engineering,* v. 67, Feb. 1948, p. 181-185.

How echo techniques similar to those of sonar and radar are used to locate hidden defects inside solid metal objects.

11-34. Alternating Current Measurements of Magnetic Properties. Horatio W. Lamson. *Proceedings of the I.R.E.,* v. 36, Feb. 1948, p. 266-277.

A critical analysis of various procedures for determining the permeability and core loss of ferromagnetic materials, together with a discussion of the limitations under which such observations are made and the interpretations which should be applied to the data obtained.

11-35. Improved Machine for Production of Polished Metallurgical Specimens. (In Russian.) N. M. Zarubin and A. I. Fraiman. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1257-1259.

Details of above machine.

11-36. Microfurnace for Determination of the Melting Point of Slags. (In Russian). P. V. Umrikhin and V. I. Dyachkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1260-1261.

An improved "furnace" directly connected to the microscope.

11-37. Appareil Pour la Mesure Rapide de l'Epaisseur des Couches Superficielles. (Apparatus for Rapid Measurement of the Thickness of Surface Layers.) J. J. Trillat and H. Gervais. *Journal des Recherches du Centre National de la Recherche Scientifique, No.* 1, 1947, p. 41-43.

The apparatus described is based upon one observed in a British plant. It is used to measure the thickness of nonmagnetic layers on magnetic base metals with an accuracy of 0.01 mm.

11-38. Studio Delle Proprieta Elastiche Dell 'Alluminio con un Metodo Elettroacustico. (Study of the Elastic Properties of Aluminum by an Electro-Acoustic Method.) P. G. Bordoni. *Alluminio,* v. 16, Nov.-Dec. 1947, p. 495-502.

A method of measurement whereby the elastic parameters of solids and their internal friction may be determined accurately at various ambient temperatures. Data obtained in a preliminary research on the effects of impurities on the elastic properties of aluminum are given.

11-39. X-Ray Diffraction Cameras for Metallurgical Specimens. D. W. Davison. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Jan. 1948, p. 7-10.

Two types of cameras, one for "grazing-incidence" and one for back-reflection.

11-40. Report of the Electron Microscopy Conference — London, March 1947. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Jan. 1948, p. 23-27.

11-41. The Pulse Polarizer in Corrosion Research. Glenn A. Marsh. *Corrosion and Material Protection,* v. 5, Jan.-Feb. 1948, p. 15-20.

Instrument designed to provide reproducible data on the polarization of metals. Essentially it consists of a high-voltage d.c. source, a pulse discharge mechanism, a sensitive polarization detector, and a high-speed recorder. How such data are used to evaluate surface coatings, corrosion inhibitors, relative corrosivity of different chemicals or solutions, and other present and potential uses in corrosion and electrochemistry. 15 ref.

11-42. Balancing Rotating Parts. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 94-97.

Problems involved and methods used to do the job. Two Gisholt Dynetric balancing machines are used.

11-43. Dark-Field Electron Microscopy. Part I. Studies of Crystalline Substances in Dark Field. C. E. Hall. *Journal of Applied Physics,* v. 19, Feb. 1948, p. 198-212.

Dark-field images were studied by an objective aperture system fixed to the object rather than to the objective lens. The resolution in images produced by the diffusely scattered component is in the range 100 to 200 A, but the resolution in images produced by Bragg reflections approaches that obtainable in bright-field operation. A resolution of about 50 A was obtained with test objects consisting of evaporated films containing small crystallites but it is estimated that crystallites having dimensions down to about 20 A can be recorded. Substances studied included evaporated films of metals and compounds and finely divided materials. Theoretical factors influencing resolution. 32 ref.

11-44. Sieve Analyses of Powdered Metals Affected by Atmospheric Humidity. *Steel,* v. 122, Feb. 23, 1948, p. 89-90, 116.

Differences of as much as 10% between weights of fractions of powdered iron sieved in high and low-humidity atmospheres were observed by Bureau of Standards investigators.

11-45. Applications of the Magnetic Oscillograph. R. H. Cole. *Iron Age,* v. 161, Feb. 26, 1948, p. 74-77.

The instrument's possibilities and limitations and some of its unique applications in the metalworking industry.

11-46. X-Ray Thickness Gage. *Electronics,* v. 21, March 1948, p. 154, 156, 158, 160, 162, 164, 166, 168.

Circuit and application details of instrument designed by W. N. Lundahl of Westinghouse for measuring the thickness of cold rolled steel sheet and cold rolled copper. The instrument should also prove applicable for use on hot materials like metal and glass sheet, and fragile materials like foil and paper.

11-47. An A.C. Operated Mass Spectrograph of the Mattauch Type. A. E. Shaw and Wilfrid Rall. *U. S. Atomic Energy Commission,* MDDC-409, Oct. 28, 1946, 19 pages.

Mass spectrograph for chemical analysis of solid samples. The Mattauch arrangement of a 31° 50′ electric deflection followed by a 90° deflection in a magnetic field was used in order to obtain a large mass range in focus on one plate. Examples of the resolution with nickel ions.

11-48. Quantitative Relations Between the Photographic Response of X-Ray Films and the Quality of Radiation. Herman Hoerlin and Victor Hicks. *Non-Destructive Testing,* v. 6, Fall 1947, p. 15-19.

Experiments reported covered, in a general way, the sensitivities of three types of films to wave lengths ranging from those used in X-ray diffraction to those emitted by radium. In the main, unfiltered radiation was used. 10 ref.

11-49. Radiographic Film Processing Units. S. B. Page and H. F. Kaiser. *Non-Destructive Testing,* v. 6, Fall 1947, p. 22-23, 51. Reprinted from Report No. M-3004, X-Ray and Radiography Section, Metallurgy Division, Naval Research Laboratory, U. S. Navy.

Mass production unit designed to insure utmost quality, but with due

regard to restrictions existing during the war on critical materials.

11-50. A Logarithmic Step Tablet for X-Rays. G. M. Corney and H. E. Seemann. *Non-Destructive Testing,* v. 6, Fall 1947, p. 27-30.

A method commonly used for rapid comparison of X-ray films consists in exposure of strips of the films beneath a stepped wedge, made up of equal steps of some metal such as aluminum or steel. Estimates of relative speeds are then made by placing the processed strips side by side, and comparing densities. This method is subject to several errors. Details of the design of a step tablet which is not subject to these errors. Typical data.

11-51. A Soviet Electron Microscope. (In Russian.) V. N. Vertsner. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Nov. 1947, p. 1364-1375.

A new type developed late in 1946, having a resolving power in the neighborhood of 20 A, or direct magnification of about 100,000, is described in considerable detail. Photographs, constructional and circuit diagrams, and representative micrographs obtained with it.

11-52. Methods of Investigation Using the Electron Microscope. (In Russian.) A. I. Frimer and S. L. Pupko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Nov. 1947, p. 1375-1387.

Soviet methods. 29 ref.

11-53. Method for Determination of the Temperature Range of the Ac_1 Transformation in Steels. (In Russian.) I. N. Golikov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1435-1440.

Improved method and apparatus for the above and results of its use on a series of plain-carbon and low-alloy steels (the latter containing up to 2.75% Cr or 5.17% Ni). The method is claimed to be very simple and accurate and to be applicable also to other structural transformations of steel.

11-54. Self-Printing X-Ray Diffraction Interplanar Scale. A. P. DeBretteville, Jr., and S. Benedict Levin. *Review of Scientific Instruments,* v. 19, Feb. 1948, p. 120-121.

Instrument prints an interplanar scale in Angstrom units on one-half of an X-ray diffraction picture, thus enabling one to look at a diffraction picture and record directly values of interplanar spacings without measuring the diameter of the X-ray diffraction rings and solving the Bragg equation.

11-55. Methods of Hardening Rail Ends and Reconditioning them to Control Rail Battering. R. P. Winton and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 398-404.

Instrument designed for measurement of profiles and batter of rail ends. Instructions for its use.

11-56. Precision Instruments; Methods of Developing Existing Standards of Accuracy. *Metal Industry,* v. 72, Feb. 20, 1948, p. 151-152. Based on paper by A. J. Philpot.

Several methods using magnification by conversion of one type of effect to another. (Presented to Royal Society of Arts.)

11-57. Nomographs for Computing Exponential Relationships. A. H. Canada. *General Electric Review,* v. 51, March 1948, p. 44-47.

How they can be used to resolve relationships used in infrared spectroscopy.

11-58. Laboratory Tests and Equipment (Concluded). J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 46, March 1948, p. 76-83.

Various tests for evaluating the deposited metal. 24 ref.

11-59. Grain Orientation in Aluminum Revealed by Anodic Film. André Hone and E. C. Pearson. *Metal Progress,* v. 53, March 1948, p. 363-366.

Technique which will readily reveal individual grain orientations of Al and its alloys. It is also believed applicable to other metals, provided an anodic film can be formed whose optical properties are related to the orientation of the substrate. The film is applied to a surface which has been polished either mechanically or electrolytically. The film produced is uniform over the surface of any one grain, but varies from grain to grain as a function of orientation.

11-60. X-Ray Identification of Sigma Phase in 25-20 Cr-Ni Stainless. W. J. Barnett and A. R. Troiano. *Metal Progress,* v. 53, March 1948, p. 366-367.

Technique developed for the identification of small amounts of the sigma phase in austenitic stainless steels, which alleviates the often uncertain results of present metallographic procedures and allows positive identification of a given microconstituent.

11-61. Bits and Pieces. *Metal Progress,* v. 53, March 1948, p. 371-373.

Marking of Lucite Mounts, by Joseph F. Cerness; Convenient Temporary Mount, by Henry Thompson; Etchant for Welds, by Gerard H. Boss; Proper Photography of

Hardened Zones, by John J. Gibbons; Rapid Mounting of Specimens, by T. J. Lepito; and Grease Guard for Baldwin-Southwark Testing Machine, by T. S. Howald.

11-62. Uber Die Möglichkeit der Abbildung von Atomen im Elektronenmikroskop III. Kontraste von Kristallgittern und Elektronenmikroskopisches Phasenkontrastverfahren. (The Possibility of Resolving Atoms in the Type III Electron Microscope. Comparison of the Crystal-Lattice and the Electron-Microscope. Contrast Processes.) H. Boersch. *Monatshefte fur Chemie,* v. 78, no. 1-2, 1948, p. 163-171.

Experimental results indicate that mono-atomic crystalline and amorphous layers of atoms of the higher order of magnitude are discernible and also that individual atoms in a crystal may become recognizable with a slight improvement of present resolving power. Further research is planned.

11-63. Standardization of Buffing for Preparation of Atmosphere Exposure Test Panels. C. C. Cupps and A. K. Graham. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 276-279; discussion, p. 280.

Development of an automatic machine for buffing flat 4 x 6 in. panels which gives greater uniformity and may prove of value for comparison of buffability of plated coatings.

11-64. A Process for the Production of Iron-Free Alum. Part I.—Laboratory Development. Edwin A. Gee and W. K. Cunningham. *Bureau of Mines, Report of Investigations* No. 4191, Feb. 1948, 27 pages.

Investigation of processes for extraction of alumina from low-grade bauxites and clays.

11-65. The Study of Segregations and Inclusions in Steel by Microradiography. W. Betteridge and R. S. Sharpe. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 185-191.

Technique is described in detail, including a simple mechanical method for preparation of the necessary thin samples. Tables of linear absorption coefficients for different characteristic radiations are included to facilitate the identification of different segregates and inclusions. Examples of application to the study of steels and conclusions concerning effects of different factors on segregations and inclusions. 12 ref.

11-66. The Measurement of Paint Film Thickness on Mild Steel. F. Fancutt and J. C. Hudson. *Paint Technology,* v. 13, Feb. 1948, p. 49-57.

Experiences with two methods; the A.R.D. Thickness Tester and the Electromagnetic Thickness Meter of the Dutch Corrosion Committee. In the absence of disturbing factors, both instruments are capable of giving reproducible readings of paint-film thickness with ±10% accuracy. The A.R.D. instrument said to be simpler, more robust, and more suitable for general industrial use. Complications arise when either the material within the paint film or immediately beneath it has magnetic properties. The values observed are also affected by the roughness of the surface of the paint film or of the mild steel to which it is applied, by differences in composition of the steel base and, in the case of certain painting schemes, by softness of the paint film itself.

11-67. Refraction Effects in Electron Diffraction and in Electron Microscopy. H. Raether. *Nature,* v. 161, Feb. 28, 1948, p. 311.

Some recent work which indicates that fine structure of electron diffraction patterns of crystals of magnesium oxide, cadmium oxide, and others, results from refraction at the faces of the regularly shaped crystal cubes. This phenomenon is treated mathematically and it is suggested that it may also be of importance in electron microscopy.

11-68. Surface Radiography With Alpha Rays. C. Joch. *Nature,* v. 161, Feb. 28, 1948, p. 314.

The short lived atoms of radium A, B, C, and C′ are deposited on the surfaces of objects which come in contact with radon. Three of them emit alpha rays. The emulsion of a photographic plate is blackened by these particles. The geometric properties of the surface cause a different blackening due to the alpha emission of the deposit on the surface. A radiographic method which shows the structure of the surface was developed on the basis of this phenomenon.

11-69. Comparison of Metallographic and X-Ray Measurements of Retained Austenite. William J. Harris, Jr. *Nature,* v. 161, Feb. 28, 1948, p. 315-316.

Addition of a mixture of high-molecular-weight alkyl dimethyl benzyl ammonium chlorides known as "Zephiran Chloride" to a solution of nitric acid in alcohol was found to result in metallographic measurements practically identical to X-ray measurements, although reproducibility of the latter was better.

11-70. Thickness Testing of Paint and Metal Coatings on Steel. Donovan H. Lee. *Sheet Metal Industries,* v. 25, March 1948, p. 555.

Magnetic thickness tester and its use.

11-71. On the Investigation of Specimen Contamination in the Electron Microscope. James Hillier. *Journal of Applied Physics,* v. 19, March 1948, p. 226-230.

Results of a series of experiments indicate that contamination is a result of chemical reaction, occurring at any surface simultaneously bombarded by electrons and organic molecules. The organic vapors are shown to arise in two ways: by diffusion out of metal walls, gaskets, and greases exposed to the vacuum, and by outgassing of metal parts of the instrument. (Presented at 1946 meeting of Electron Microscope Society of America, Pittsburgh.)

11-72. Ferrous Alloys; Investigation of Electrolytic Etching Solutions. W. I. Pumphrey. *Iron and Steel,* v. 21, March 1948, p. 75-80.

Results of a study of a number of potentially suitable solutions for electrolytic etching of ferrous alloys and the effect of each electrolyte on a number of different materials ranging from cast iron to high-alloy stainless steel. The nature of electrolytic etching.

11-73. Recording Crevices in Plane Surfaces by Pigment-Fillings Held in Cellulose Acetate Molds. A. T. J. Dollar. *Nature,* v. 161, March 6, 1948, p. 358.

New procedure useful for etched or abraded plane surfaces of rocks, minerals, and metals.

11-74. Photometric Measurement of Specific Surface. B. A. Scott. *Nature,* v. 161, March 6, 1948, p. 358-359.

In the course of measurements of the light transmission of dispersions of fine alumina powder in aqueous media, it was found that effective projected area per unit weight of powder gives a fairly good straight line when plotted against the 4th power of the wave-length of the incident light. This method, which is rapid and economical of sample material, is capable of giving a good estimate of the specific surface of alumina powders over a wide range of values (1000 to 40,000 sq. cm. per g.), and may find application to other transparent crystalline materials.

11-75. Fractography; The Study of Fractures at High Magnification. C. A. Zapffe, F. K. Landgraf, Jr., and C. O. Worden, Jr. *Iron Age,* v. 161, April, 1948, p. 76-82.

Principal features and application of fractography to the study of various ferrous and nonferrous metals, including Zn, Bi, Fe-Si alloys, Fe-Cr alloys and Mo. Of particular interest is the association of certain features, visible in the fractographs, with physical properties and characteristics of the metals involved.

11-76. Sharp-Focusing X-Ray Tube for Structural Analysis. (In Russian.) V. D. Bezverkhii and B. Ya. Pines. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Nov. 1947, p. 1341-1352.

Construction and operation. Typical results.

11-77. Lead Telluride Cells for Infrared Spectroscopy. O. Simpson, G. B. B. M. Sutherland, and D. E. Blackwell. *Nature,* v. 161, Feb. 21, 1948, p. 281.

Some results which indicate the potentialities of above cells for spectroscopic work, where they are clearly far superior to sulphide and selenide types.

11-78. Worm Gears. *Automobile Engineer,* v. 38, March 1948, p. 117-118.

David Brown Universal worm-gear-testing machine No. 12A.

11-79. The Determination of Equilibrium Diagrams. G. V. Raynor, *Journal of the Birmingham Metallurgical Society,* v. 28, March 1948, p. 3-23; discussion, p. 24-36.

The various methods.

11-80. The Adiabatic Temperature Changes Accompanying Magnetization in Low and Moderate Fields: A Further Study of Iron. L. F. Bates and E. G. Harrison. *Proceedings of the Physical Society,* v. 60, March 1948, p. 225-235; discussion, p. 235-236.

It was found possible to use a commercial instrument in place of a "home-made" fluxmeter with the Bates and Eston method of measuring small changes of temperature. The new instrument was used to make a further study of the small heat changes which accompany step-by-step changes in the magnetization of iron, using the specimen of annealed Armco iron previously studied by Bates and Healey, and a specimen of H. S. electrolytic iron. Heat changes associated with the virgin magnetization curve were obtained for the first time. 12 ref.

11-81. The Measurement of the Permeability of Low-Conductivity Ferromagnetic Materials at Centimeter Wave Lengths. J. B. Birks. *Proceed-*

ings of the Physical Society, v. 60, March 1948, p. 282-292.

A wave guide impedance method for the above measurement which avoids the difficulties and anomalies present in earlier measurements. Apparatus and techniques used at 20 to 60 cm., 6 to 15 cm., 3 cm., and 1¼ cm., and some typical results of measurements on γ-ferric oxide. It is shown that the observed magnetic dispersion is an inherent property of the material, and is not attributable to skin-effect. 16 ref.

11-82. A New Device for Maintaining Constant Stress in a Rod Undergoing Plastic Extension. E. N. da C. Andrade. *Proceedings of the Physical Society,* v. 60, March 1948, p. 304-307.

Simple mechanical device. The midpoint of the wire maintains its position during extension, so that it may be observed by use of a fixed microscope.

11-83. A Rapid X-Ray Method for the Determination of the Orientation of Single Crystals or Large-Grained Polycrystalline Aggregates. A. E. De Barr. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, March 1948, p. 102-104.

A type of goniometer which enables a crystal to be set in a given orientation. The method makes use of strong, high-Bragg-angle reflections on a fluorescent screen. Orientation of any given face is calculated from the readings of two angle scales on the instrument, and is plotted on a stereographic projection.

11-84. Polishing Metallographic Specimens With Diamond Dust. G. C. Woodside and H. H. Blackett. *Industrial Diamond Review,* v. 8, March 1948, p. 92-93. Reprinted from *Metal Progress,* v. 51, June 1947, p. 945-947.

Previously abstracted. See item 11-79, R.M.L., v. 4, 1947.

11-85. Applications of the Angle Dekkor. B. P. Harrold. *Machinery* (London), v. 72, March 25, 1948, p. 391-397.

Simple and sturdy optical instrument used for checking angles in the shop, and its accessories. Various applications.

11-86. Control of Automatic Resistance Heating Machine. M. B. Ladd. *Electrical Manufacturing,* v. 41, April 1948, p. 118-121.

Uniform heating of forging blanks by low-voltage, high-amperage current is closely controlled by phototubes which actuate relays, and through them solenoid valves, hydraulic-clamping contacts, and transformer-input switches. Construction and circuit diagrams.

11-87. Oscillographic Performance Check of an Automatic Cutter Sharpener. Royce E. Johnson and Frank A. Glassow, *Electrical Manufacturing,* v. 41, April 1948, p. 122-124.

Use of a three-element magnetic oscillograph enables electrical, mechanical, and hydraulic functions to be coordinated accurately and results in simplification of the electrical controls of a hob-cutter sharpener.

11-88. Determination of Phase Fields. William L. Fink. *Metal Progress,* v. 53, April 1948, p. 530-535.

Several useful ways for determination of concentration limits at various temperatures.

11-89. New Process Control Instruments for Chemical Industry. Everett S. Lee. *Chemical Engineering Progress,* v. 44, April 1948, p. 263-267; discussion, p. 267-268.

Briefly describes and gives applications of mass-spectrometer-type instruments, thermal gas analyzers, X-ray photometer, dew point recorder, fault detector, and recording spectrophotometer.

11-90. Microradiography of Gray Cast Iron. E. I. Salkovitz, J. H. Schaum, and F. W. Von Batchelder. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 82-88; discussion, p. 88.

A technique by which graphite in gray cast iron may be studied with conventional X-ray equipment. Good results are obtained by using an industrial type, tungsten-target, X-ray tube. The effects of different exposure times, photographic plates, and radiation. Photo-micrographs and microradiographs of the same specimens are included to permit comparison of the graphite as observed by the two different methods.

11-91. Instrumentation in Openhearth Practice. J. Talfryn Davies. *Iron and Steel Institute Special Report* No. 39, "Reports of the Affiliated Local Societies", Dec. 1947, p. 28-36.

Need for instrumentation in the iron and steel industry, particularly in connection with openhearth furnaces. Various systems for use on the gas producer and the furnace itself. (Presented at a meeting of Swansea and District Metallurgical Society, Swansea, England, Jan. 19, 1946.)

11-92. New Method for Determination of the Thickness of Naturally Passive Films on Metals. (In Russian.) I. V. Krotov and T. M. Khachadurova. *Iz-*

vestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), Jan.-Feb. 1948, p. 50-56.

A simple method using a stylus weighted with lead collars of varying weights. The relationship of depth of abrasion to load for films on aluminum is shown graphically. The curve has two sections: one corresponding to deformation of the film without rupture, and one to rupture. A graphical and mathematical method for determining film thickness from the deformation section of the curve.

11-93. Metal Optics at Centimeter Wave-Lengths—Part I. L. Speirs. *Philosophical Magazine,* 7th Series, v. 39, Feb. 1948, p. 105-116.

The optical properties of metals in the form of thin films. Two methods were used to investigate the surface resistance of metal films at a wave-length of 1.25 cm. In one the guided wave is allowed to traverse the film and its support once; reflection and transmission coefficients are found by direct measurement of the reflected and transmitted waves. The second method consists in loading a cylindrical-cavity resonator with the film supported on a flat disk of "low-loss" material, and noting the resonance frequency before and after its insertion.

11-94. A New Experimental Electron Microscope. G. Liebmann. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Feb. 1948, p. 37-43.

Instrument deviates in many ways from known types. It employs four permanently aligned magnetic lenses and optical magnification. A new type of specimen stage, permitting a quick exchange of specimen, wide-angle stereoscopic observations, direct calibration of specimen position, and an improved electron gun are used. It can be quickly adapted for electron-diffraction observations. Possibilities of further development.

11-95. Polarographic Study of Corrosion Phenomena. Pierre Van Rysselberghe, John M. McGee, Armin H. Gropp, Robert D. Williams and Paul Delahay. *Corrosion and Material Protection,* v. 5, March-April 1948, p. 11-16.

Use of polarograph, experimental technique, and analysis and interpretation of polarograms.

11-96. Phase Microscopy With Vertical Illumination. Helen Jupnik, Harold Osterberg, and G. E. Pride. *Journal of the Optical Society of America,* v. 38, April 1948, p. 338-342.

Adaptation of phase microscopy for observing specularly reflecting specimens with the vertical illuminator. The method can be used advantageously to examine those surface irregularities which give rise to small differences in optical path or in phase between the reflected-ray bundles. Both bright and dark contrast with excellent definition may be obtained by use of suitable diffraction plates.

11-97. Mold Dryness Measured by New Device. R. E. Hadady. *Foundry,* v. 76, May 1948, p. 322, 324, 326.

Instrument known as the "Electric Hygro-Cel" which responds in less than one second to either decreasing or increasing moisture in the surrounding air.

11-98. The Value of Pressure Tests and Radiographs of Gun Metal Castings. W. H. Baer. *American Foundrymen's Association, Preprint No.* 48-43, 1948, 7 pages.

Correlates X-ray findings with hydrostatic pressure tests, at 250 psi. for 15 min., of gun metal cast plates of various thicknesses.

11-99. Apparatus for Measuring Young's Modulus and Decrement of Graphite and Metals. John W. Michener and J. S. Handloser. *U. S. Atomic Energy Commission,* MDDC-1428, Nov. 5, 1947, 12 pages.

Instrument is essentially an impedance bridge for measuring the a. c. resistance between two electrodes of a quartz crystal which are part of a composite oscillator. The oscillator is a quartz bar, to which is glued a specimen of the material under test.

11-100. Use of New Mechanical Equipment. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 108-112.

An illustrated survey by C. R. FonDersmith of some new types of equipment for speeding up furnace repair and maintenance.

11-101. Tungsten Wire Straightener. A. A. Jarrett. *U. S. Atomic Energy Commission,* MDDC-1646, Feb. 3, 1945, 2 pages.

Device which aids in straightening 5 to 9 mil. diameter wire.

11-102. Apparatus for the Rapid Taking of Magnetization Curves. K. P. Belov and G. M. Strakhovskij. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 103-105. Translated and condensed from *Zavodskaya Laboratoriya,* no. 6, 1946, p. 577-582.

Details of method using a cathode-

ray oscilloscope. Circuit diagrams, fundamentals of the method, and typical results.

11-103. The Detection, Separation and Microtitration of Iridium. W. B. Pollard. *Bulletin of the Institution of Mining and Metallurgy,* April 1948, p. 9-18.

Methods for Au, Pt, and Pd used in the assay of ores and concentrates and for control of refinery operations. Reports indicate that with Cu-Ni ores it is possible to make an assay for these metals on a 100 to 300 g. sample. With concentrates, a reduction to about 1/40 in the amount of assay sample is possible. 15 ref.

11-104. An Oxide Replica Technique for the Electron Microscope Examination of Stainless Steel and High Nickel Alloys. E. M. Mahla and N. A. Nielsen. *Journal of Applied Physics,* v. 19, April 1948, p. 378-382.

The oxide film is produced on the metal surface by oxidation in a molten nitrate solution and is chemically stripped from the base metal by a bromine-methanol solution. Replicas of this type were used to study deep-etched structures, preferential etch attack, and secondary phases in austenitic and ferritic stainless steel and in nickel.

11-105. Preferred Orientation Determination Using a Geiger Counter X-Ray Diffraction Goniometer. B. F. Decker, E. T. Asp, and D. Harker. *Journal of Applied Physics,* v. 19, April 1948, p. 388-392.

Use of a simple and accurate method of determining pole figures for absorption change and change in diffracting volume as the sample changes position with respect to the X-ray beam. Results for cold-rolled copper.

11-106. Simultaneous Measurement of Tensional and Electrical Resistance of Fine Wires. J. T. Norton and G. C. Kuczynski. *Instruments,* v. 21, April 1948, p. 328.

Application to strain-gage material to determine gage factors and fatigue characteristics.

11-107. A Fifty-Point Bridge Balance Unit for Use With a Baldwin SR-4 Strain Indicator. N. C. Fick and N. A. Crites. *Instruments,* v. 21, April 1948, p. 329-330.

Device designed and built at Battelle Memorial Institute to make a complete stress analysis of a structure under progressive loading.

11-108. Simplified Dynamic Strain Equipment. Will J. Worley. *Instruments,* v. 21, April 1948, p. 330-332.

Method of adapting a commercial strain indicator (Baldwin-Southwark portable unit) to repeated dynamic strain measurements.

11-109. Recent Advances in Electron Microscopy in the United Kingdom. V. E. Cosslett. *Research,* v. 1, April 1948, p. 293-304.

Applications to study of particle size and shape, metallurgical work and biological research; techniques and electron-microscope developments.

11-110. Applications of the Angle Dekkor. B. P. Harrold. *Machinery* (London), v. 72, April 8, 1948, p. 458-460.

Applications of device for checking angles described in March 25 issue.

11-111. Electronic Comparators. *Machinery Lloyd* (Overseas Edition), v. 20, April 10, 1948, p. 104-110.

Use in inspection procedures.

11-112. Vacuum Furnace Control. Frank F. Davis. *Electronics,* v. 21, May 1948, p. 81.

An electronic control which will safeguard tungsten heaters against burnout due to excessive gas pressure.

11-113. Rototrol in Steelmaking. *Westinghouse Engineer,* v. 8, May 1948, p. 73-74.

Equipment for control of a variety of steel-mill equipment. It is essentially a small d.c. generator. Its application to blooming mills and pickling lines.

11-114. X-Ray Thickness Gage for Hot Strip Rolling Mills. C. W. Clapp and R. V. Pohl. *Electrical Engineering,* v. 67, May 1948, p. 441-444.

Condensed from "An X-Ray Thickness Gage for Hot-Strip Rolling Mills", to be published in *A.I.E.E. Transactions,* v. 67, 1948.

11-115. An Indentation Method for Measuring Wear. *Machine and Tool Blue Book,* v. 44, May 1948, p. 141-144, 148, 150, 152.

Use of McKee wear gage, developed at Bureau of Standards. As little as one hundred thousandth of an inch is measured under favorable conditions.

11-116. Small, Simple Machine Tests Gears and Lubricants. *Automotive Industries,* v. 98, May 1, 1948, p. 46, 58.

Machine for bench testing.

11-117. Calibration of X-Ray Measurement of Strain. John A. Bennett and Herbert C. Vacher. *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 285-293.

Method and results obtained in

an investigation on the elastic and plastic deformation of metals.

11-118. Magnetic Measurement of the Thickness of Composite Copper and Nickel Coatings on Steel. Abner Brenner and Eugenia Kellogg. *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 295-299.

Previously abstracted from *Plating,* v. 35, March 1948, p. 242-246. See item 8-52, 1948.

11-119. Electronic and Servo Electronic Controls and Their Application to the Iron and Steel Industry. W. G. Thompson. *Journal of the Iron and Steel Institute,* v. 158, April 1948, p. 497-509.

An extensive survey. 19 ref.

11-120. Self-Absorption of Spectrum Lines. R. D. Cowan and G. H. Dieke. *Reviews of Modern Physics,* v. 20, April 1948, p. 418-455.

A study of the mechanism of self-absorption and its effects on the intensities and line shapes of spectrum lines. It was found that a relatively simple model is quite adequate to explain the observed facts in such important cases as arcs and sparks, and that refinements in the theory change the results only in relatively minor details. 56 ref.

11-121. The Determination of Pore Size Distribution From Gas Adsorption Data. C. G. Shull. *Journal of the American Chemical Society,* v. 70, April 1948, p. 1405-1410.

The theory of the interpretation of gas adsorption data in terms of capillary condensation as advanced by Wheeler. It is suggested that the empirical use of experimental adsorption data for materials of large crystal size is preferable to the employment of the BET theory at higher relative pressures (0.35 to 0.99) in evaluating the multilayer thickness of the adsorbed layers. A simplified procedure for applying the theory of capillary condensation to experimental data, thereby obtaining the pore-size distribution.

11-122. Systematic Etching Tests Identify Nonmetallic Inclusions in Steel. H. V. Kinsey. *Canadian Metals and Metallurgical Industries,* v. 11, April 1948, p. 14-16.

The type of results to be expected from use of a systematic series of etching tests to positively identify nonmetallic inclusions in steel.

11-123. Vinyl-Metal Combination. *Modern Plastics,* v. 25, May 1948, p. 166.

Commercially produced material which can be used for sealing porous casings or seams in metal work. It is made by combining a metallic powder and a specially prepared vinyl compound.

11-124. Phase Diagrams and the Phase Rule. William L. Fink. *Metal Progress,* v. 53, May 1948, p. 672-675.

Auxiliary experimental problems and a simplified derivation of the phase rule. Concluding portion of "Determination of Phase Diagrams."

11-125. Air-Driven Spinners. L. W. Wightman. *Machine Design,* v. 20, May 1948, p. 121-125.

Devices designed for testing fast-rotating machine components up to bursting speeds posed difficult design problems.

11-126. Low-Torque Potentiometers Simplify Many Control Problems. H. D. Wright. *Machine Design,* v. 20, May 1948, p. 134-136.

Design and applications of typical types of low-torque potentiometers, such as one mounted on the face of a dial-micrometer gage for control or remote indication of thickness.

11-127. Measurement of Thickness of Oxide Coatings on Aluminum Alloys. Ralph B. Mason and William C. Cochran. *Metal Finishing,* v. 46, May 1948, p. 69-73.

Previously abstracted from *A.S.-T.M. Bulletin,* Oct. 1947, p. 47-51. See item 11-200, R.M.L., v. 4, 1947.

11-128. Quantitative Methods of Studying Aeolotropy in Steel Sheet and Strip. N. F. Astbury and A. E. D. Barr. *Sheet Metal Industries,* v. 25, May 1948, p. 911-916, 921.

Refers to phenomenon usually known as anisotropy. How it can be studied by the use of information derived from measurements of Young's modulus and how in certain cases estimates can be made of the actual degree of crystal orientation present. Estimates can also be made of the principal moduli of single crystals. Experimental technique and details of calculations involved in analysis of the data.

11-129. Etude Des Structures Superficielles Au Moyen Des Rayons X. (Study of Surface Structures by Means of X-Rays.) Ch. Legrand. *Journal des Recherches du Centre National de la Recherche Scientifique,* No. 3, 1947, p. 147-151.

Techniques including necessary calculations. Application to the surfaces of metals and alloys for various purposes.

11-130. Une Methode Rapide de Preparation des Cristaux Uniques Metalliques. (A Rapid Method of Preparing

Single Metallic Crystals.) Paul Lacombe and Louis Beaujard. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 44, Oct. 1947, p. 269-273.

Previously abstracted from *Revue de Métallurgie,* v. 44, March-April 1947, p. 65-70. See item 11-219, R.M.L., v. 4, 1947.

11-131. Radiography in the Foundry. (In English.) R. Jackson. *Metalen,* v. 2, March 1948, p. 131-151.

Use in steel industry. Various defects revealed by X-ray and a comparison between mechanical tests and radiographic examination.

11-132. The Polarization Microscope. B. K. Johnson. *Endeavour,* v. 7, April 1948, p. 57-65.

Fundamental principles involved. Examples of its application to practical problems, especially in metallurgy, biology, and chemistry.

11-133. Practices and Trends in Steel-Mill Control. A. W. Schmitz. *General Electric Review,* v. 51, May 1948, p. 34-37.

Improvements made in amplidyne and electronic-control systems.

11-134. Direct-Reading Contact Scale for Analysis of X-Ray Spectrometer Charts. Wilfrid R. Foster. *Analytical Chemistry,* v. 20, May 1948, p. 489-490.

Its construction.

11-135. Metallurgical Books. (Continued.) Sibyl E. Warren. *Metals Review,* v. 21, May 1948, p. 41, 43.

This section of classified bibliography of books published during 1936-46 covers metallography and heat treating. (To be continued)

11-136. Phase-Angle Determination in X-Ray Crystallography. Alexander R. Stokes. *Nature,* v. 161, May 1, 1948, p. 679-680.

A. D. Booth has suggested that a study of the diffuse reflections in X-ray diffraction photographs should give information as to the phase angles of the Bragg reflections. Two serious theoretical difficulties in this argument.

11-137. Eine Halbzylinderkamera zur Bestimmung kleiner Abstandsanderungen in Kristallgittern mittels Röntgenstrahlen. (A Semicylindrical Camera for Determination by X-Ray of Small Distance Variations in Crystal Lattices.) F. Gunther. *Archiv fur Metallkunde,* v. 1, Oct. 1946, p. 14-15.

Surveys the various methods and apparatus used.

11-138. Ein Beitrag zur Gitterkonstantenbestimmung und röntgenographischen Spannungsmessung an grob kristallinen Werkstoffen. (A Contribution to the Determination of Lattice Constants and the X-Ray Stress Measurement of Coarse Crystalline Materials.) F. Lihl. *Archiv fur Metallkunde,* v. 1, Oct. 1946, p. 25-31.

Reflex method using a revolving camera. Test results obtained in this way compared with those obtained by the "abpinsel" method—in which the sample and the camera are moved simultaneously with the revolving film, the distance being kept constant.

11-139. Beitrag zur Frage: Villardspannung oder Gleichspannung fur technische Röntgendurchstrahlungs-Einrichtungen. (Contribution to the Question: Villard Potential vs. D. C. Potential for Industrial X-Ray Rectification Equipment.) H. Verse. *Archiv fur Metallkunde,* v. 1, Oct. 1946, p. 32-36.

Data for the two types of circuits when used for the investigation of various metals. The Villard Circuit is a modified d.c. circuit.

11-140. On the Resolving Power of the Ordinary X-Ray Spectrograph and the Natural Width of X-Ray Spectral Lines. D. Coster and H. De-Lang. *Physica,* v. 13, Aug. 1947, p. 379-384.

Resolving power based on the photographic method, using calcite as analyzing crystal, depends primarily upon the dimensions of the spectrograph. With the aid of a spectrograph of large dimensions, linewidths were determined.

11-141. Méthode d'étude des Equilibres Enchevetrés. (Method for Study of Complex Equilibriums.) Marcel Pourbaix. *Revue de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 292-301; discussion, p. 301.

A graphical method in which two of the factors involved are charted along the ordinate and abscissa respectively; the other factors are considered as parameters. The characteristic equilibria thus appear as a family of lines, each of which corresponds to a definite value of the parameter. When the characteristic equilibria of the different reactions which are possible in a given system are charted on the same graph, the result is a complex system of many families of lines which forms a diagram which is useful in study of the system.

11-142. Le Micropolissage. (Micropolishing.) E. Knuth-Winterfeldt. *Métaux & Corrosion,* v. 23, Jan. 1948, p. 5-8.

New method particularly suitable for preparation of very small polished surfaces for microstructural examination.

11-143. An Adjustable Curved Crystal Monochromator For X-Ray Diffraction Analysis. P. M. De Wolff. *Applied Scientific Research,* v. B1, No. 2, 1948, p. 119-126.

An apparatus which minimizes aberration and requires no high-precision work in making a crystal holder; further, the monochromator can easily be set to a large range of wave lengths and crystal-to-focus distances.

11-144. Apparatus for Weighing in Vacuum. G. W. Monk. *Journal of Applied Physics,* v. 19, May 1948, p. 485-486.

Apparatus which can be used to measure the weight of a sample in a vacuum (0.01 micron) at temperatures up to about 700° C.

11-145. Effect of Recrystallized Grain Size on Grain Growth. Paul A. Beck. *Journal of Applied Physics,* v. 19, May 1948, p. 507-509.

Mathematical relationships are derived for slide rule calculation for both flat and cylindrical films.

11-146. Gear Testing. *Automobile Engineer,* v. 38, May 1948, p. 191-192.

Machine and method used in development of materials and lubricants which will allow higher surface stresses and greater tooth loads to be employed.

11-147. Photoelasticity. J. Ward. *Automobile Engineer,* v. 38, May 1948, p. 193-196.

Recent developments in an advanced testing technique. (To be continued.)

11-148. Servo-Control of a Testing Machine. Howard C. Roberts and Harold W. Katz. *Radio-Electronic Engineering,* (Bound with *Radio News,* v. 39), v. 10, May 1948, p. 6-9, 29.

A system for measuring, restoring, controlling, recording and adjusting a testing-machine load. (Condensed from paper presented at National Electronics Conference, Chicago, Nov. 3, 1947.)

11-149. Segregations and Inclusions; Their Study in Steel by Microradiography. W. Betteridge and R. S. Sharpe. *Iron and Steel,* v. 21, May 13, 1948, p. 242-245, discussion, p. 272-275.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 185-191. See item 11-65, 1948.

11-150. Electron Diffraction for Film and Surface Studies. G. A. Doxey. *Electronics,* v. 21, June 1948, p. 112-113.

Crystalline structures of thin films can be determined by diffraction patterns produced when electrons are directed through the material. Surfaces of materials are studied by patterns of reflected electrons. Applications and equipment.

11-151. The Electron Microscope and its Application to Materials Problems. J. I. Wittebort. *Technical Data Digest,* v. 13, June 15, 1948, p. 9-20.

Theory, construction, operation, and applications.

11-152. Neutronen Durchleuchtung. (Neutron Radiography.) Otto Peter. *Zeitschrift fuer Naturforschung,* v. 1, Oct. 1946, p. 557-559.

Said to be the first time that radiographs were made by use of slow neutrons. The pictures lack the sharpness of those made with gamma rays, but they have certain new fields of application.

11-153. Präzisionsvergleich von Gitterkonstanten mittels Fraunhofer-Anordnung. (Precision Comparison of Lattice Constants by Means of the Fraunhofer Apparatus.) Gottfried Mollenstedt. *Zeitschrift fuer Naturforschung,* v. 1, Oct. 1946, p. 564-566.

New technique which corrects errors of earlier methods, especially disturbances caused by superposition.

11-154. Determination of Low Vapor Pressures at High Temperatures. Part 1. Vapor Pressure of Bismuth. (In Russian.) A. Granovskaya and A. Lynbimov. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, Jan. 1948, p. 103-106.

New apparatus and data for bismuth in the range 450 to 700° C.

11-155. A Note on the Measurement of Plating Thickness. C. H. R. Gentry. *Analyst,* v. 73, March 1948, 157-158.

Modification of jet test devised by the British Non-Ferrous Research Association, in which the "penetration point" is detected by recording the change of potential on exposure of the underlying metal, of the half cell formed by the plated article in contact with the jet of reagent solution.

11-156. Sur l'Analyse Spectrographique de Substances Solides. (Spectrographic Analysis of Solid Materials.) Alain Berton. *Comptes Rendus* (France), v. 226, March 15, 1948, p. 892-894.

New arrangement of electrodes which provides a cavity for the powdered substance, in the lower electrode, and a simple electrical circuit and mechanical method for varying the temperature of the arc.

11-157. Design and Applications of a New Metals Comparator. D. E. Bovey. *Instruments,* v. 21, May 1948, p. 467-470.

Previously abstracted from *General Electric Review,* v. 50, Nov. 1947, p. 45-49. See item 11-198, R.M.L., v. 4, 1947.

11-158. Plastic Replicas for Surface-Finish Measurement. J. Pearson and M. R. Hopkins. *Journal of the Iron and Steel Institute,* v. 159, May 1948, p. 67-70.

Technique for the above.

11-159. The Fourier Method of Crystal Structure Analysis. W. Cochran. *Nature,* v. 161, May 15, 1948, p. 765.

Method of synthesis from observed X-ray reflection intensities.

11-160. Analyzing Graphical Records. Charles E. Balleisen. *Machine Design,* v. 20, June 1948, p. 145-149.

Practical methods of determining rates of change by graphical and numerical differentiation.

11-161. Beta Rays Make Better Gages. *Electronic Industries,* v. 2, June 1948, p. 19.

Use of radioactive isotopes in a new gage developed in the research laboratory of Goodyear Tire and Rubber Co. to measure sheets of Pliofilm and other thin films. The new gage reads accurately to a hundred-thousandth of an inch.

11-162. Radioactive Contaminants in Tracers; Origin, Detection, Identification and Removal. Waldo E. Cohn. *Analytical Chemistry,* v. 20, June 15, 1948, p. 498-503.

From the standpoint of the individual user. General causes, techniques and procedures involved. 39 ref.

11-163. Particle Size Determinations With Electron Microscopes. John H. L. Watson. *Analytical Chemistry,* v. 20, June 15, 1948, p. 576-584.

Important practical errors inherent in the methods of electron microscopy and how to minimize them, and procedures for securing semiquantitative data from electron micrographs.

11-164. Giant Pressure Vessel Built for Testing Navy Underwater Equipment. *Steel,* v. 122, June 21, 1948, p. 119.

11-165. Nouvelle méthode d'étude des ferromagnétiques dans les champs alternatifs faibles. Application a quelques alliages. (A New Method for the Study of Ferromagnetic Materials in Weak Alternating Fields. Application to Certain Alloys.) Israel Epelboim. *L'Université de Paris Thesis,* Series A, No. 2128, 1946, 25 pages.

Method and apparatus is applicable to cases of induction or sinusoidal fields. It was applied to study of ferronickel alloys after different heat treatments.

11-166. A High Temperature-High Vacuum Apparatus. Leo Brewer, LeRoy A. Bromley, Paul W. Gilles, and Norman L. Lofgren. *U. S. Atomic Energy Commission,* MDDC-367, Oct. 1, 1946, 16 pages.

Pyrex glass apparatus by which temperatures up to 2500° C. were obtained with vacuums better than 10^{-4} mm. while hot. Pressures better than 10^{-5} mm. are obtainable in the cold. Design and operation are simple and times of heating and cooling are very short.

11-167. On Variation in Materials, Testing, and Sample Sizes. Leslie E. Simon. *American Society for Testing Materials, Preprint* No. 103, 1948, 5 pages.

Scientific sampling of materials: design of experiment; execution of tests; and interpretation of results.

11-168. Genomskinligt inbäddningsmedel för metallografiska prov. (Transparent Embedding Agent for Metallographic Work.) Roland Kiessling. *Jernkontorets Annaler,* v. 132, 1948, p. 110-111.

A method, using methyl methacrylate as transparent embedding agent.

11-169. Sur l'obtention de surfaces métalliques fraiches par abrasion mécanique dans le vide, et sur l'étude de ces surfaces par diffraction électronique. (The Production of Clean Metallic Surfaces by Mechanical Abrasion Under Vacuum, and Study of Such Surfaces by Electron Diffraction.) Robert Courtel. *Comptes Rendus* (France), v. 226, March 8, 1948, p. 793-795.

New technique which is believed to have great potentialities.

11-170. Régulation automatique d'un four de laboratoire a resistance de kryptol. (Automatic Control of a Laboratory Furnace Having "Kryptol" Heating Elements.) E. Bonnier and G. Weiss. *Verres et Réfractaires,* v. 2, April 1948, p. 91-94.

Apparatus including circuits. ("Kryptol" is a type of graphite or carbon.) It is claimed that variations of temperature at 1500° C may be reduced to ± 4 to 5° C.

11-171. An Electrolytic Tank for Exploring Potential Field Distributions. R. Makar, A. R. Boothroyd, and E. C. Cherry. *Nature,* v. 161, May 29, 1948, p. 845-846.

In a series of studies using solutions of $CuSO_4$ in distilled water of concentration varied between 0.5 and 8.0 g. per l., and Cu electrodes of various diameters, very accurate results were obtained with a measuring frequency of 1000 cycles/sec.

and electrodes 0.5 mm. in diameter, provided that current per electrode was not less than a 5 milliamp. or that current density did not exceed 0.3 milliamp. per sq. mm. For such fine electrodes, steel sewing needles plated by the copper cyanide process are particularly suitable.

11-172. The Principles and Uses of Simulated Service Testing. L. L. Wyman. *Materials & Methods,* v. 27, June 1948, p. 63-67.

Uses in testing performance of jet-engine assemblies, fatigue, corrosion, and strength of structures.

11-173. X-Ray Diffraction Cameras for Metallurgical Specimens. D. W. Davison. *Engineers' Digest* (American Edition), v. 5, May-June 1948, p. 195-196. Condensed from *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Jan. 1948, p. 7-10.

11-174. Application of Statistical Methods to Study of Gas-Turbine Blade Failures. Charles A. Hoffman and G. Mervin Ault. *National Advisory Committee for Aeronautics, Technical Note* No. 1603, June 1948, 27 pages.

Investigation to determine applicability of statistical methods as an approach to the evaluation of materials when formed into a particular service shape and operated at accelerated life conditions.

11-175. On the Temperature Dependence of the Intensity of Electron Diffraction of the Aggregate of Minute Crystals—A Possible Means to Determine the Cleavage Surface of Minute Crystals. Shigeto Yamaguchi and Tominosuke Katsurai. *Journal of Colloid Science,* v. 3, June 1948, p. 255-258.

Special camera constructed for the study of electron diffraction at high temperature; Fe_3O_4, ThO_2, Ni, and MgO powder crystals being used. From the change of the intensity of diffraction from various planes taking place at various temperatures, the cleavage faces of the powder crystals can be determined.
sions can therefore be measured.

11-176. Measurement of Interfacial Tensions. J. C. Fisher. *Metals Technology,* v. 15, June 1948, T. N. 1, p. 1.

C. S. Smith has described a method for measuring the relative values of different solid-solid and solid-liquid interfacial tensions. Points out that the method will apply also to systems where two phases are fluid and one solid, and that absolute values of solid-solid, solid-liquid, and solid-vapor interfacial ten-

11-177. Quick Method for Detecting Preferred Orientation. Paul A. Beck. *Metals Technology,* v. 15, June 1948, T. N. 2, p. 2-3.

Extremely simple and rapid optical method for the qualitative detection of preferred orientation in annealed aluminum specimens.

11-178. Correlation of Optical and Electron Microscopy. J. S. Bryner. *Metals Technology,* v. 15, June 1948, T. P. 2364, 7 pages.

Specimen screen, containing an opening which can be absolutely identified and quickly located in the electron microscope and can be fastened to the silica film replica in such a position that the desired field on the specimen is located at the identifiable opening in the specimen screen.

11-179. A Method for Determining the Origin of Surface Defects in Rolled Steel Products. C. L. Meyette and V. E. Elliott. *Metals Technology,* v. 15, June 1948, T. P. 2368, 15 pages.

Defects in the ingot prior to rolling are characterized by the penetration of oxide surrounding the flaw. These are classed as steel-type defects. Those formed in either the primary or secondary rolling operations do not show any appreciable penetration. They are classed as mechanical-type defects. The method was applied to 10 grades of steel and was found applicable to all but one—18-8 stainless. Certain limitations of the method are considered with respect to rerolled products and to silicon steels.

11-180. A Simple Way of Photographing Spectra. R. A. Houstoun. *Nature,* v. 161, June 19, 1948, p. 973-974.

New technique in which the telescope object glass and the eyepiece were left in position and the camera was placed immediately after the eyepiece. The field of view of the spectrometer eyepiece was too narrow, but on substituting the eyepiece of a prismatic field glass which took in a cone of semivertical 53′, the experiment succeeded; the visible spectrum covered the full breadth of the film and was in perfect focus from end to end.

11-181. Effects of Overheating Aluminum Determined by Color of Coating. P. A. Haythorne and H. B. Wiley. *Product Engineering,* v. 19, July 1948, p. 104-105.

Method whereby the structural properties of aluminum suspected to be impaired from accidental exposure to heat can be appraised

11-182. Electron Optical Schlieren Ef-
angle 128′ instead of the previous
from color changes in zinc chromate coated surfaces.

fect. *Technical News Bulletin* (National Bureau of Standards) v. 32, July 1948, p. 82-84.

New technique for quantitative study of electrostatic or magnetic fields that are not susceptible to any other type of investigation. Extension of the principle provides a powerful means of broadening present knowledge concerning space-charge fields, fields produced by contact potentials, wave-guide problems, and the microstructure of metals.

11-183. A New Method for Studying Fractures of Porcelain Enameled Specimens. F. A. Peterson, Rodney A. Jones, and A. W. Allen. *Journal of the American Ceramic Society,* v. 31, July 1, 1948, p. 186-193.

A process which locates microscopic cracks in an enamel layer shows great promise in the study of different types of fractures. The stress conditions in the enamel-iron-enamel system before, during, and after thermal shock are analyzed.

11-184. Applied X-Ray Metallography. Norman P. Goss. *Steel,* v. 123, July 5, 1948, p. 98, 101-102.

First of a series designed for the beginning metallographer. Fields of application, fundamental results obtained by its use, advantages, and limitations. (To be continued.)

11-185. Neutron Diffraction and Associated Studies. E. O. Wollan and C. G. Shull. *Nucleonics,* v. 3, July 1948, p. 8-21.

Neutron diffraction techniques are compared with similar X-ray diffraction techniques. The experimental and theoretical description of the interaction of neutrons with crystals, molecules, and nuclei is related to present and potential applications to metallurgy, crystal structure, and certain fundamental nuclear studies. 33 ref. (To be concluded.)

11-186. Navy Instruments Photograph Instantaneous Phenomena. *Iron Age,* v. 162, July 15, 1948, p. 89.

11-187. A Refined Metallographic Technique for the Examination of Surface Contours and Surface Structure of Metals; Taper Sectioning. A. J. W. Moore. *Metallurgia,* v. 38, June 1948, p. 71-74.

The taper-sectioning technique for studying the surface features of metals. In many respects its use permits closer study than the normal cross-section micro-examination method.

11-188. The Positive Print Method of Measuring X-Ray Reflections From a Single Crystal. R. G. Wood and Gordon Williams. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 202-204.

A photometer for use in Dawton's positive print method for determining the relative intensities of the above reflections. Determination of standarized processing conditions.

11-189. High-Speed Photography of Welding Arcs. F. Brailsford and K. F. Shrubb. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 211-213.

A camera designed and used for photographing the transfer of metal in the metallic-arc process of welding. It may be used at speeds up to 2500 pictures per sec. Operating technique and examples of work done.

11-190. An Improved Technique for Setting Single Crystals From Zero Layer-Line Photographs. Olga Weisz. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 213-214.

Existing techniques were modifide to permit easy determination of errors in the two goniometer arcs from a single composite stationary-crystal photograph taken with one arc parallel to the beam, and the other perpendicular to it.

11-191. The Adjustment of a Crystal From X-Ray Rotation Photographs. A. Bairsto. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 215-216.

A method of correcting small errors in the setting of crystals. Complete rotation photographs are used. Three complete rotation photographs were taken at slightly different crystal settings, and the correct orientation was worked out by a simple graphical method.

11-192. Metallographische Auswertung von Oberflächenshichten durch Flachschliff-Verfahren. (Metallographic Examination of Surface Layers Prepared by a Polishing Process.) H. Klemm. *Metall,* Nov. 1947, p. 79-83.

Methods used to prepare surfaces vertical to the surface of the specimen, thus making it possible to observe cross-sectional structure, which is especially useful on specimens coated with oxides, sulphides or other forms of corrosion, or with protective films. Formula for calculating true thickness of surface films.

11-193. A Mains Operated Valve Voltmeter for the Measurement of Secondary Current in Resistance Welding Machines. A. J. Hipperson. *Welding Research,* v. 11 (Bound with

Transactions of the Institute of Welding, v. 11), June 1948, p. 40r-42r.

Development, construction, and calibration of this voltmeter. Use is confined to the measurement of the magnitude of sinusoidal current, since its operation is fundamentally dependent upon the relationship between the peak value and the R. M. S. value of a sinusoidal wave train. Current controlled by the phase-shift method cannot be measured.

11-194. Pore Size Distribution in Porous Materials; Interpretation of Small-Angle X-Ray Scattering Patterns. H. L. Ritter and L. C. Erich. *Analytical Chemistry,* v. 20, July 1948, p. 665-670.

The theory as developed by Guinier was applied simply and approximately to porous aggregates and results are reduced to continuous distributions of pore size. A method for inversion of the Guinier integral under certain simplifying assumptions and a simple semi-empirical method of making the correction for a finite collimating system. Results are correlated with data from adsorption measurements and from the mercury porosimeter. 16 ref.

11-195. An Improvement in Lead Laps. Walter H. Bruckner. *Metal Progress,* v. 54, July 1948, p. 63.

The author encountered some difficulties with the serrated cast-iron plate used to work the abrasive into the lead lap, since corrosion products also became embedded. Use of "Type 2B Ni-Resist" eliminated the trouble.

11-196. Chromatic Aberration of Resolving Power in Electron Microscopy. E. G. Ramberg and J. Hillier. *Journal of Applied Physics,* v. 19, July 1948, p. 678-682.

Calculations of the effect of chromatic aberration and diffraction show that with an objective aperture smaller than the "optimum aperture", and centered optics, such inhomogeneities do not appreciably affect the resolution, even in the extreme case that the electrons are uniformly distributed in energy.

11-197. X-Ray, Electron, and Neutron Diffraction. C. G. Shull and E. O. Wollan. *Science,* v. 108, July 23, 1948, p. 69-75.

Some comparisons of results which can be obtained by these three techniques; their advantages and disadvantages in particular applications.

11-198. Sharp Edges; Determination of Their Dimensions. J. Ferdinand Kayser. *Iron and Steel,* v. 21, July 1948, p. 325-328.

Methods used. Thickness of extreme edge of sharpest wafer-blades is less than about half a micron. Application to edged tools and other sharp articles.

11-199. Cathode-Ray Magnetization Curve Tracer. M. V. Scherb. *Review of Scientific Instruments.* v. 19, July 1948, p. 411-419.

An instrument developed to measure the magnetic properties of materials in a variety of forms by oscillographic techniques. Magnetic hysteresis loops can readily be obtained for specimens in rod, powder, tape, or wire form having cross-sectional areas as small as 10^{-5} sq. cm. or as large as 0.3 sq. cm. With slight modifications, the instrument can be adapted to magnetic measurements of materials as a function of frequency, temperature, tension, torsion, or pressure. 10 ref.

11-200. Ultrasonics Miscellany. H. Manley. *Discovery,* v. 9, July 1948, p. 212-216.

Application of radiations having same velocity as sound but a greater frequency and consequently shorter wave length. Methods for producing ultrasonics and use in detecting flaws in metal, interspersion of two metals which are not mutually soluble, such as lead-iron or tungsten-iron, and heating.

11-201. Residual Stress Analysis of Overspeeded Disk With Central Hole by X-Ray Diffraction. James N. Good. *National Advisory Committee for Aeronautics, Research Memorandum* No. E8E11, July 23, 1948, 30 pages

Methods and results of an X-ray diffraction analysis of residual surface stresses after plastic strain was introduced in a parallel-sided 3S-O aluminum disk with a central hole by two types of centrifugal overspeed.

11-202. Recent Developments in Surface Measurement. Allen G. Gray. *Products Finishing,* v. 12, Aug. 1948, p. 70, 72, 74, 76, 78, 80.

Methods and equipment.

11-203. A Method for Measuring Wear. *Production Engineering & Management,* v. 22, Aug. 1948, p. 54.

Investigations conducted at the National Bureau of Standards led to the adaptation of a diamond indentation method of measuring wear. A sensitive measuring instrument developed to measure extremely small increments of wear, as little as one hundred-thousandth of an inch under favorable conditions.

11-204. Compensating Pyrometer for a Moveable Thermocouple (In Russian.) B. D Katsnelson and V. V. Pomerantsev *Kotloturbostroenie* (Boiler and Turbine Manufacture), Jan.-Feb. 1948, p. 29-31.

Construction of the above for the measurement of gases in a chamber. The theoretical basis for the apparatus, the validity of these principles, and the accuracy of the operation at high temperatures.

11-205. A Method of Measuring Lateral Pressure During the Pressing of Samples of Powder Metallurgy. (In Russian.) V. N. Goncharova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 575-578.

Lateral pressure during the pressing of samples of powder metals is determined according to the deformation of the mold, which indicates the forces operating laterally in the mold. Formulas for this computation and for the computation of the toughness of the mold.

11-206. Application of Conic Impression to the Study of the Rate of Resistance to Deformation of Metals. (In Russian.) F. F. Vitman, N. N. Davidenkov, N. A. Zlatin, and B. S. Ioffe. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 579-594.

Proposes a new method of determining the characteristic mechanical strength of metal. This method consists of the analysis of the field of deformation induced by a cone and of the selection of criteria of the rate of deformation. The theoretical bases, procedure, mathematical computations. 12 ref.

11-207. Multiple Differential Thermal Analysis. Paul F. Kerr and J. L. Kulp. *American Mineralogist,* v. 33, July-Aug. 1948, p. 387-419.

Equipment is designed to further increase the utility of this method. Through the use of standard recording devices in circuit with multiple units, six differential thermal curves may be obtained simultaneously. This arrangement makes it possible to secure a large number of determinations in a short time —18 curves in an 8-hour day. 15 ref.

11-208. An X-Ray Method for Studying Skin Thickness of Bronze Castings. Carleton G. Lutts. *Non-Destructive Testing,* v. 6, no. 4, Spring 1948, p. 13-14, 21.

New technique for X-raying castings by cutting out thin slices of metal ⅛-in. thick through the full cross section of the casting and X-raying them with low voltage equipment. Resulting exographs reveal a strikingly different condition at the surface of a casting as compared to the center portions. Method is more useful for research or development work than for production control.

11-209. A Portable Ultrasonic Thickness Gage. Dwight J. Evans. *Non-Destructive Testing,* v. 6. No. 4, Spring 1948, p. 22-24, 42.

Theory of operation, and application of the "Audigage" in thickness determinations of steel pipes, tanks, pressure vessels, and other structures accessible from only one side.

11-210. Tracer Isotopes. *Engineer,* v. 186, July 30, 1948, p. 110-111.

Application to metallurgical problems.

11-211. Steel Mill Applications of Electronic Control. J. Raymond Erbe. *Iron and Steel Engineer,* v. 25, Aug. 1948, p. 93-101.

In many cases, electronic control offers a more simple design than conventional equipment. Several electronic applications which are now in operation in the steel industry.

11-212. Application of Similarity Principles to Metallurgical Problems. M. W. Thring. *Research,* v. 1, Aug. 1948, p. 492-500.

The role of model studies as a scientific technique. Fundamental principles for the construction of dynamic models.

11-213. Neutron Diffraction and Associated Studies. Part II. E. O. Wollan and C. G. Shull. *Nucleonics,* v. 3, Aug. 1948, p. 17-31.

Theory and procedures for the application of neutron diffraction techniques to problems in crystallography, metallurgy, and fundamental nuclear physics. 42 ref.

11-214. A Method for the Evaporation of Alloys. Louis Harris. *Journal of Applied Physics,* v. 19, Aug. 1948, p. 739-741.

A method for evaporation of alloys in high vacuum which should be applicable to all alloys that are not refractory. The method has been tested on alpha-brass and beta-brass and on a gold-cadmium alloy.

11-215. Measurements of Thomson Coefficients for Metals at High Temperatures and of Peltier Coefficients for Solid-Liquid Interfaces of Metals. J. J. Lander. *Physical Review,* ser. 2, v. 74, Aug. 15, 1948, p. 479-488.

Apparatus devised for measuring Thomson coefficients of metals at high temperatures. Experimental results for the Peltier coefficients for

solid-liquid interfaces of gold, silver and copper are reported.

11-216. New Worlds for Sight. James Hillier. *Physics Today,* v. 1, Sept. 1948, p. 18-25.

Some of the many applications of the electron microscope. Explains the construction and operating principles of this instrument; its limitations and present and potential uses. An excellent collection of electron micrographs.

11-217. Measurement of Radioactive Isotopes. *Technical News Bulletin.* (National Bureau of Standards), v. 32, Sept. 1948, p. 101-104.

Methods for use of the standard radioisotope samples now available from the Bureau.

11-218. Methods for Testing Thickness of Electrodeposits. I. Effect of Internal Stress on Thickness Determinations by the Jet Method. *Plating,* v. 35, Sept. 1948, p. 922-924, 966.

Shows experimentally that internal stress in an ordinary gray nickel deposit reduces its apparent thickness as determined by the jet test method proposed and widely used in England. High-temperature annealing, which is accompanied by grain growth, raises the apparent thickness much more than stress relieving at lower temperature, and restressing after high-temperature annealing only partially restores the nickel to normal reactivity.

11-219. Sur la détermination précise des constantes réticulaires de phases métalliques a cristallisation grossiere. (Concerning the Precise Determination of the Lattice Constants of Metallic Phases Consisting of Coarse Crystals.) René Graf and Sylvette Monteil. *Métaux & Corrosion,* v. 23, May 1948, p. 109-115.

Monochromatic diagrams of metallographic specimens of this type are very difficult to investigate. Theoretical study resulted in development of a method which makes it possible to obtain correct diagrams even in the case of monocrystals.

11-220. Sur une méthode d'essai rapide de résistance a l'érosion par cavitation. (A Rapid Method for Determination of the Resistance to Erosion By Cavitation.) Y. Bonnard and E. Josso. *Métaux & Corrosion,* v. 23, May 1948, p. 116-123.

Apparatus consists of a magnetostrictive generator of vibrations in the liquids in which the samples are immersed, which simulates the cavitation effect. Typical results for a series of ferrous and nonferrous alloys.

11-221. Applied X-Ray Metallography. (Continued.) Norman P. Goss. *Steel,* v. 123, Sept. 6, 1948, p. 114, 117, 132, 134-136, 138-139.

Elementary principles of lattice structure. Explanations of Miller indices and calculation of lattice parameters. (To be continued.)

11-222. Method for Preparation of Alloys of Various Concentrations. (In Russian.) V. S. Kogan and B. Ya. Pines. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, March 1948, p. 377-382.

Vapor-deposition method for preparing very pure specimens as standards in X-ray diffraction work.

11-223. New Method for Investigation of Plastic Deformation. (In Russian.) N. S. Akulov and N. Z. Miryasov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, March 1948, p. 389-394.

A new method which is very sensitive and gives a more complete picture of plastic deformation in ferromagnetic crystals and polycrystals than is obtained by X-ray methods. It consists in precipitation in polished surfaces of magnetized particles from suspension in alcohol. The particles assume a pattern which indicates the zones of plastic deformation or heterogeneity.

11-224. Electronic Radiography and Microradiography. Jean-Jacques Trillat. *Journal of Applied Physics,* v. 19, Sept. 1948, p. 844-852.

Two techniques of radiography by means of secondary photoelectrons liberated by hard X-rays, one by reflection and one by transmission. Special fine-grained photographic emulsions are required which will not be affected by X-rays traversing the film, but are sensitive to photoelectrons liberated from the surface of a specimen in intimate contact with the photographic film or paper.

11-225. Automatic Polishing of Metallographic Samples. E. D. Holt. *Metal Progress,* v. 54, Sept. 1948, p. 350-352.

Automatic machine that polishes as many as twelve samples at one time. The procedure is unusual in that the same abrasive is used for the first three polishing operations, which are done on an alundum stone, a lead lap, and cloth, successively.

11-226. How the Camera Solves Tough Plant Problems. *Modern Industry,* v. 16, Sept. 15, 1948, p. 50-53.

Solution of a variety of problems by different types of photography

11-227. How to Align Long Straightedges. *American Machinist,* v. 92, Sept. 23, 1948, p. 99.

Set-up for checking 20-ft. straightedge by electrical contact with a piano wire stretched between two reference blocks.

11-228. Pompage électromagnétique des métaux fondus. (Electromagnetic Pumping of Molten Metals.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, March-April 1948, p. 30-31.

New device for the above.

11-229. Analyse granulométrique par sédimentation; Applications a la métallurgie des poudres. (Grain-Size Determination by Sedimentation; Application to Powder Metallurgy). Nguyen Thien-chi. *Métaux & Corrosion,* v. 23, June 1948, p. 137-146.

Two methods by a French commercial laboratory. As an example, the grain-size determination of tungsten is described.

11-230. Une méthode directe d'étude de certains états de surface: le meulage dans le vide avec controle simultané par diffraction électronique. (A Direct Method for Study of Certain Surface States; Grinding Under Vacuum With Simultaneous Electron-Diffraction Examination.) R. Courtel. *Métaux & Corrosion,* v. 23, June 1948, p. 165-166.

Results obtained using new technique which eliminates atmospheric contamination effects.

11-231. Application of Differential Thermography to the Study of the Aging of Aluminum Alloys. (In Russian.) L. P. Luzhnikov and L. G. Berg. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 824-828.

Method of application and the apparatus used. Five aluminum alloys of different compositions and heat treatments were investigated to illustrate the method.

11-232. A Photoelectric Exposure Meter for Photomicrography, Keith F. Alder. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Sept. 1948, p. 300-301.

Instrument described consists essentially of a gas-filled cesium-type photo-electric cell coupled to a two-stage d.c. amplifier, with an indicating meter in a bridge circuit in the output. To date the instrument has been used only for metallography.

11-233. The Stereogoniometer. A. Taylor. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Sept. 1948, p. 301-304.

Device for measuring the orientation of crystals in coarse-grained polycrystalline metals. By means of a link mechanism, the orientations are instantaneously transferred to a plotting table to give their correct positions on a stereographic projection.

11-234. Laboratory and Workshop Notes. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Sept. 1948, p. 320-324.

A Voltage Stabilizer for Photometer Lamps, R. J. Hercock; A Simple High-Temperature X-Ray Camera Furnace, R. L. Woolley; A Change-Over Relay Operated by Pulses of One Polarity Only, H. Rostron Hindley; An Adjustable Stand for X-Ray Cameras, William Hume-Rothery and C. MacIntyre; A Stand for X-Ray Diffraction Cameras, A. N. Lanham and D. P. Riley; Isolating Circuit for Bridge Amplifiers, W. A. Prowse; and An Improved Saw for Hard Materials, H. F. Atkinson.

11-235. High Angle X-ray Diffraction at Elevated Temperatures, E. G. Steward. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Sept. 1948, p. 331-332.

By means of the electric furnace, the "back-reflection" method may be used at temperatures up to about 900° C. for single crystals and polycrystalline specimens. Constructional and operational details, and the attainment of higher temperatures. Temperature may be maintained to within ±2° C. 11 ref.

11-236. X-Ray Diffraction Film-to-Specimen Gauge. E. P. Warekois. *Review of Scientific Instruments,* v. 19, Sept. 1948, p. 607.

Describes and diagrams simple device.

11-237. Reactions of Ions in Aqueous Solution With Glass and Metal Surfaces. James W. Hensley, Arthur O. Long, and John E. Willard. *Journal of the American Chemical Society,* v. 70, Sept. 1948, p. 3146-3147.

Use of radio-active tracers for study of the above. The method consists of immersing small flat samples in a solution of the radio-actively tagged ion, removing, rinsing, and drying; and determining the intensity of the radio-activity on each with the aid of the Geiger-Mueller counter.

11-238. A Versatile Vacuum-Fusion Apparatus. Manley W. Mallett. *American Society for Metals, Preprint* No. 41, 1948, 19 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 870-887; discussion, p. 887-892.

Method and apparatus for estima-

tion of gases in metals, including details of construction and operation. Analytical difficulties arising from the presence of large inclusions of Al_2O_3, glassy SiO_2, and refractory nitrides.

11-239. Solder Flow Tester for Tinplate. J. J. Sperotto. *American Society for Metals, Preprint* No. 43, 1948, 6 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 940-945; discussion, p. 945-946.

A simple and rapid method for comparing the flow of soft solders on sheet metal, particularly adapted to thin sheets such as tinplate. The method consists essentially of placing a constant-volume pellet of solder on a tinplate disk together with an excess of flux and heating the disk above the melting point of the solder. The extent to which the molten solder spreads on the plate is measured with a planimeter.

11-240. Direct Electron Microscopic Thickness Determinations of Ultramicroscopically Thin Crystals. John H. L. Watson, Wilfried Heller, and Wesley Wojtowicz. *Journal of Chemical Physics,* v. 16, Oct. 1948, p. 999-1000.

Procedure and typical micrographs obtained by its use.

11-241. Electron-Optical Techniques for Ferromagnetic Studies. *Electrical Manufacturing,* v. 42, Oct. 1948, p. 186, 188.

New method analogous to the light-optical Schlieren effect which provides a powerful tool for studies of field intensities and domain theory, and for related research investigations. Applications, including metallurgical problems.

11-242. X-Ray Measurement of Strain in Metal. *Technical News Bulletin.* (National Bureau of Standards), v. 32, Oct. 1948, p. 113-115.

Previously abstracted from *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 285-293. See item 11-117, 1948.

11-243. Isotopes for Industry. Colin Carmichael. *Steel,* v. 123, Oct. 4, 1948, p. 74-75, 108, 111-112.

Present and potential uses in research and control.

11-244. Displacement Measurement by Mechanical Interferometry. R. Weller and B. M. Shepard. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, no. 1, 1948, p. 35-38.

Method and possible uses for this phenomenon.

11-245. Device for Obtaining Samples of Slag at Varying Depths From Open Hearth Furnaces. M. Y. Medshibozhsky. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 362. Translated and abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, no. 1, 1948, p. 113-115.

The usual method of testing the composition of slag by taking a sample with a ladle is not considered satisfactory, as the results obtained are only applicable to the level or depth at which the sample is extracted. The device permits obtaining several samples simultaneously at different levels. It consists of several mild-steel pans attached to a common spindle and covered with thin copper foil which melts with the heat of the slag, permitting the latter to fill the pans simultaneously at different levels.

11-246. A Direct Coupled Amplifier for Recording Dynamic Strain. W. R. Mehaffey, J. N. Van Scoyoc, and D. S. Schover. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, no. 1, 1948, p. 44-54.

Includes circuit diagrams.

11-247. New Method of Plotting the Blackening Curve for X-Rays. III. (In Russian.) V. N. Protopopov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 687-692.

A new graphic method for determining relationships of the intensities of the lines in X-ray spectra.

11-248. Apparatus for X-Ray Structural Analysis of Monocrystals. (In Russian.) Yu. A. Bagaryatskii and M. M. Umanskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 693-702.

Different types of X-ray apparatus developed in the U.S.S.R. Methods of application of the different types of installations.

11-249. Apparatus for the Measurement of the Surface Tension of Liquid Metals. (In Russian.) L. L. Kunin and Yu. A. Klyachko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 756-758.

The apparatus is described and illustrated by a schematic drawing and photographs. Theoretical bases and method of calculation.

11-250. Une détermination de la texture des poudres de fer a grand champ coercitif par la mesure de leur chaleur de mouillage. (Determination of the Structure of Iron Powders of Large Coercive Field by Measurement of Their Heat of Wetting.) Louis Weil. *Comptes Rendus* (France), v. 227, July 5, 1948, p. 48-50.

Attempts to establish a relationship between the average grain size of iron powders and their heat of

wetting. The method of investigation and the phenomena observed.

11-251. Détermination spectrographique de la solubilité du cadmium dans l'étain solide. (Spectrographic Determination of the Solubility of Cadmium in Solid Tin.) Henry Triché. *Comptes Rendus,* v. 227, July 5, 1948, p. 52-54.

A method for the above. Factors to be considered, such as influence of heat treatment and preliminary chemical treatment. Comparative investigation of commonly used methods showed that the proposed method results in more precise data.

11-252. The Function of Open Hearth Instruments. I. G. Reginald Bashforth. *British Steelmaker,* v. 14, Sept. 1948, p. 415-418.

Progress in the design of instruments, desirability of automatic control, and the operators' attitude to instrument control. (To be concluded.)

11-253. The High-Speed X-Ray, Newest Supplement to Vision. Charles M. Slack. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 319, 363-364.

Present and potential applications.

11-254. Graphical Study of Metallurgical Equilibria. M. J. N. Pourbaix and C. M. Rorive-Boute. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 15 pages.

Method and data for the zinc-oxygen, carbon-oxygen, and zinc-carbon-oxygen systems as examples.

11-255. The Determination of Flatness of Surfaces and Straightedges; Methods and Instruments Developed at the Rochdale Technical School. *Machinery* (London), v. 73, Sept. 30, 1948, p. 497-500.

11-256. Impregnated Cloth of Many Uses. *Modern Plastics,* v. 26, Oct. 1948, p. 96-97.

"Celastic", a cotton fabric impregnated with cellulose nitrate and a fire retardant, and some of its uses, which include repair of rusted auto bodies and for bonding metal to wood in foundry patternmaking.

11-257. Color Metallography. W. D. Forgeng. *Iron Age,* v. 162, Oct. 14, 1948, p. 130-133.

The use of color in metallography is particularly advantageous in alloys containing carbides, inclusions, or sigma-phase constituents; and in grain-size determinations not possible by usual metallographic methods. Direct comparisons between black-and-white reproductions and color prints of identical structures for nine alloys. Etching and photographic techniques.

11-258. Telltale Isotopes Reveal Secrets to Industry. *Automotive Industries,* v. 99, Oct. 15, 1948, p. 40-43, 94, 96, 98.

A second article on uses of radioactive isotopes in industry. Metallurgical applications.

11-259. An Extruding Die for Powdered X-Ray Diffraction Specimens. M. Grotenhuis, G. F. Durst, and A. G. Barkow. *Non-Destructive Testing,* v. 7. Summer 1948, p. 15-18.

Techniques of its use. Results, obtained using three general techniques.

11-260. The Analysis of Industrial Problems; Coordinated Spectroscopy and X-Ray Diffraction. Wm. J. Poehlman and W. A. Kluck. *Non-Destructive Testing,* v. 7, Summer 1948, p. 19-22.

Examples of typical problems showing the application of spectroscopy, X-ray diffraction, and the combination of both methods.

11-261. On the Extinction-Coefficient: Particle Size Relationship for Fine Mineral Powders. H. E. Rose and C. C. J. French. *Journal of the Society of Chemical Industry,* v. 67, July 1948, p. 283-289.

Researches on measurement of the size characteristics of mineral powders by photo-extinction methods which have led to an experimentally derived curve relating the extinction coefficient for a suspension to the size of particle of the material in suspension, for the size range 0 to 50 microns. 15 ref.

11-262. La diffusion des Rayons X par un alliage partiellement ordonné. (Diffusion of X-Rays by a Partially-Ordered Alloy Lattice.) A. Guinier and R. Griffoul. *Acta Crystallographica,* v. 1, Sept. 1948, p. 188-193.

The diffuse reflections from a partially ordered lattice were computed, for a special case, in terms of a single parameter, the degree of short-range order. In the case of a three-dimensional lattice the results obtained are applicable only in particular cases; in general, it is necessary to specify the degree of both short and long-range order. 10 ref.

11-263. Electron Microscope Goniometry. A. F. Kirkpatrick and Evelyn Gagnon Davis. *Analytical Chemistry,* v. 20, Oct. 1948, p. 965-968.

The frequent occurrence of unknown crystals in electron microscopical samples presents an identification problem. How to use silhouette angles for this purpose.

11-264. Instrumentation. Ralph H. Muller. *Analytical Chemistry,* v. 20, Oct. 1948, p. 29A-30A.

Construction and operation of new type of balance made in Switzerland, but commercially available in the U. S. The balance has but one pan and all weighings are made under constant load because weights are removed, not added, as required by the sample.

11-265. Cleavage Patterns Disclose "Toughness" of Metals. C. A. Zapffe, C. O. Worden, Jr., and F. K. Landgraf, Jr. *Science,* v. 108, Oct. 22, 1948, p. 440-441.

Cleavage patterns studied by fractography contain features directly related to the "toughness" of the crystal. Two fractographs show patterns of "toughness" and two show "weakness."

11-266. Roughness of Surfaces. W. A. Tuplin. *British Science News,* v. 1, 1948, p. 18-20.

Measuring the roughness of surfaces by use of a stylus which traverses the work.

11-267. La identificazione metallografica del piombo negli acciai. (Metallographic Identification of Lead in Steel.) Luigi Cocciolo. *La Metallurgia Italiana,* v. 40, March-April 1948, p. 74-75.

A special etching agent permitting the identification of lead inclusions in high speed steels. Composition of this reagent and method of use.

11-268. Discontinuité d'absorption K de rayons X du cuivre dans les alliages aluminium-cuivre aux différents stades de précipitation. (Discontinuity of the K-Line X-Ray Absorption of Copper in Al-Cu Alloys at Different Stages of Precipitation.) Adrienne R. Weill. *Comptes Rendus,* v. 227, July 19, 1948, p. 202-204.

11-269. Simple Gnomonic Projector for X-Ray Lauegrams. Samuel G. Gordon. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 634-638.

11-270. A Simple Device for Calculating X-Ray Structure Factors. V. Vand. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Oct. 1948, p. 352.

Homemade slide-rule-type device and method of use.

11-271. The Testing of Brass and Other Constructional Materials for Ferromagnetic Impurities. J. R. Barker. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Oct. 1948, p. 363-364.

A torsion-balance magnetometer is simply and rapidly made. The effects of specimen shape and some data relating iron content and magnetic permeability of brass.

11-272. Transducers for Measuring Mechanical Displacements. *Electrical Manufacturing,* v. 42, Nov. 1948, p. 122, 124, 126.

Two recently developed methods — a mechanical system with exceptional sensitivity and an electrical method operating with little or no external actuating force—and their applications. With the first, displacements as small as 0.00001-in. can be easily measured without the aid of amplifying devices.

11-273. The Measurement of the Magnetic Properties of Non-Ferrous Metals. Zd. Trnka. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 409. Translated and abstracted from *Elektrotechnicky Obzor,* v. 36, Aug. 27, 1947, p. 305-306.

Accurate method described.

11-274. Divergent Beam X-Ray Photography with Standard Diffraction Equipment. A. H. Geisler, J. K. Hill, and J. B. Newkirk. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 1041-1049.

New method for preparing divergent beam X-ray photographs of crystals. It employs the usual Laue transmission camera and a collimated primary beam of X-rays. Fluorescent radiation originating either in the crystal sample or at a radiator in front of the crystal is used as the source of divergent X-rays. Some applications to determinations of orientation, lattice parameters, and crystal perfection.

11-275. Photomicrography of Large Specimen Areas. *Photographic Journal,* v. 88B, Sept.-Oct. 1948, p. 89.

High magnification of a large area of a metallurgical specimen. In this improved technique, the area to be examined is given only a small initial magnification by microscope so that the whole region is included in the picture. The negative is recorded on a maximum resolution plate, and further magnification is then obtained by enlargement. The result is achieved without undue loss of definition.

11-276. A Numerical Fourier-Analysis Method for the Correction of Widths and Shapes of Lines on X-Ray Powder Photographs. A. R. Stokes. *Proceedings of the Physical Society,* v. 61, Oct. 1948, p. 382-391.

A method is derived, using Fourier analysis for finding the corrected distribution of intensity across an X-ray diffraction line. The method may also be of use in spec-

trum analysis and statistical problems. 11 ref.

11-277. Surface Layers of Crystals. P. B. Hirsch and J. N. Kellar. *Nature,* v. 162, Oct. 16, 1948, p. 609-610.

X-ray method which gives the thickness of the surface layer without altering it physically. It involves measurement of the variation in the intensity of X-ray reflection from a crystal, as the angle between the surface and the Bragg reflecting planes is varied.

11-278. The Use of Electronic Instruments in Iron and Steel Making. S. S. Carlisle. *Engineer,* v. 186, Oct. 29, 1948, p. 450-451; Nov. 5, 1948, p. 476-477. A condensation.

11-279. Drilling Very Hard Materials. David A. Vermilyea. *Metal Progress,* v. 54, Nov. 1948, p. 686.

Application of a method commonly used for glass lens blanks to alloys such as Duriron, Stellite, or some of the new gas-turbine alloys.

11-280. A Tilting Stage for Leveling Metallographic Specimens. E. C. Pearson. *Metal Progress,* v. 54, Nov. 1948, p. 686-687.

Leveling device is a simplified modification of the universal stage that has been used on petrographic microscopes.

11-281. Using Tempilstiks for Determining the Heat Losses of a Furnace. Leo Satz. *Metal Progress,* v. 54, Nov. 1948, p. 687.

To obtain temperature-distribution curves for the outer walls of a furnace, chalk guide lines were drawn traversing the wall in four or more directions and intersecting at the center. By the use of "Tempilstiks" (temperature-indicating crayons), temperature gradients along each guide line were easily found.

11-282. A Camera for Microradiography. Gerard H. Boss. *Metal Progress,* v. 54, Nov. 1948, p. 689.

The photographic plate is as close to the specimen as possible and the specimen is properly lined up with the X-rays.

11-283. New Tool of Heat-Flow Research in the Glass Industry and the Ceramic Industry at Large. Victor Paschkis. *American Ceramic Society Bulletin,* v. 27, Nov. 15, 1948, p. 450-461.

Problems of temperature fields and rates of heat flow investigated by means of electric analogy. The method is based on the identity of the differential equations for heat flow in a solid and for electric current in a body with evenly distributed resistivity and capacity. It was applied to a large number of problems in various fields including the solidification of ingots and castings, temperature loss from intermittently operated furnace walls, and influence of through-metal on the insulating value of thermal insulation.

11-284. Camera for Structural Analysis, Having a Revolving Collimator and a Flat Plate Adapter, and Its Use. (In Russian.) D. B. Gogoberidze. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 823-826.

Described and illustrated. Typical X-ray diagrams obtained.

11-285. Studies of the Mattson Shot Classifier. Raymond L. Blaine and Harold J. Valis. *Journal of Research of the National Bureau of Standards,* v. 41, Nov. 1948, p. 371-378.

Size and distribution of peening and cleaning shot and sand particles of various shapes were determined by use of a new apparatus, with a microscope and by microweighings. Results indicated that the Mattson apparatus is satisfactory for visual evaluation. A more precise evaluation can be made with the apparatus by determining actual size distributions.

11-286. Multipoint Recording With a Pen Recorder Applied to Magnetic Measurements. H. M. Allred. *Review of Scientific Instruments,* v. 19, Nov. 1948, p. 818-819.

A simple, convenient method for obtaining an essentially continuous pen record of the force experienced by the sample in the field of a strong electromagnet and the temperature of the sample as it is heated by a small furnace.

11-287. A New Method for the Determination of Preferred Orientations. (In English.) J. F. H. Custers. *Physica,* v. 14, Sept. 1948, p. 453-460.

Method for determination of preferred orientations of flat specimens using rolled metal sheets. It is shown that this method implies a somewhat easier construction of pole figures and will simplify appreciably calculation of absorption.

11-288. The Intensity Distribution Along the Debye Halo of a Flat Specimen in Connection With a New Method for the Determination of Preferred Orientations. (In English.) J. F. H. Custers. *Physica,* v. 14, Sept. 1948, p. 461-474.

Referring to preceding article (see above abstract), formulas for intensity distribution along the Debye halo are given for specimens with random orientation of crystallites. The same formulas may be

used to correct for the strongly varying absorption along the Debye halo when preferred orientations are to be determined quantitatively.

11-289. 16 Mm. Cinematography at the National Physical Laboratory. J. A. Hall. *British Science News,* v. 2, No. 13, 1948, p. 19-20.

Applications to testing of ship models, wing-flutter investigations, lag constants of temperature-measuring instruments, and temperatures of liquid-steel streams.

11-290. The Cinematography of Open-Hearth Furnace Flames. J. H. Ghesters. *Journal of the Society of Glass Technology* (Transactions Section), v. 32, Aug. 1948, p. 209-210.

Application of above technique enabled flame structure, height and velocity to be studied with valuable results.

11-291. Nouvelle méthode d'étude aux rayons X des textures cristallines. (A New Method for X-Ray Investigation of Crystal Structure.) A. Guinier and J. Tennevin. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 277-286.

Specially developed apparatus. Application to the solution of a series of problems.

11-292. Photography and Steel Fabrication. Frank L. Carder. *PSA Journal,* v. 14, Nov. 1948, p. 680-682.

Photographic methods used by the metallurgist in his attempt to produce steel fabricated vessels which meet standards.

11-293. Instrumentation; First Report of the Open-Hearth Sub-Committee. F. L. Robertson. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 540-541; discussion, p. 593-595.

Presents recommendations.

11-294. X-Ray Measurement of Strain in Metal. *Welding Journal,* v. 27, Dec. 1948, p. 612s-613s.

Previously abstracted from *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 285-293.

11-295. A New Method of Determining X-Ray Intensities. N. C. Baenziger. *Journal of Chemical Physics,* v. 16, Dec. 1948, p. 1175-1176.

New solution to the problem of determining integrated intensities of X-ray reflections recorded on film which involves radioactive toning of the photographic film.

11-296. Electronics Provide a Better Precision Control Tool. Amos J. Germain. *Production Engineering & Management,* v. 22, Dec. 1948, p. 55-58.

Why and how electronic tubes function and typical examples of use of electronics in mass-production metalworking plants.

11-297. A Test for Hydrogen Embrittlement and its Application to 17 Per Cent Chromium, 1 Per Cent Carbon Stainless-Steel Wire. Carl A. Zapffe and M. Eleanor Haslem. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 281-308; discussion, p. 308-312.

Previously abstracted from *Metals Technology,* Jan. 1946, T. P. 1954. 13 ref. See item 9-13, 1946.

11-298. An Appraisal of the Factor Method for Calculating the Hardenability of Steel from Composition. G. R. Brophy and A. J. Miller. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 654-663; discussion, p. 663-669.

Previously abstracted from *Metals Technology,* Oct. 1945, T. P. 1933. See item 9-127, 1945.

11-299. Factors for the Calculation of Hardenability. Irvin R. Kramer, Sidney Siegel, and J. Gardner Brooks. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 670-697; discussion, p. 697.

Previously abstracted from *Metals Technology,* June 1946, T. P. 2029. See item 18-155. 1946.

11-300. Addition Method for Calculating Rockwell C Hardness of the Jominy Hardenability Test. Walter Crafts and John L. Lamont. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 698-718; discussion, p. 718.

Previously abstracted from *Metals Technology,* Oct. 1945, T. P. 1928. 10 ref. See item 9-126, 1945.

11-301. Verfahren zur Bestimmung der Gitterkonstanten spannungsbehafteter Proben. (Method of Determining the Lattice Constants of Stressed Specimens.) Alfred Durer. *Metallforschung,* v. 1, July-Aug. 1946, p. 60-62.

A direct x-ray method.

11-302. Ubermikroskopische Reliefdarstellung durch präge-und Doppelschichtabdrucke. (Replica and Double-Layer Technique for Electron-Microscopic Representation.) Johanna Hunger and Robert Seeliger. *Metallforschung,* v. 2, March 1947, p. 65-69.

Two improvements of usual methods.

11-303. Uber das Verhalten edler und unedler Metallionen an Metalloberflächen, sowie deren Absolut-Bestimmung mit Hilfe radioaktiver Indikatoren. (The Behavior of Noble and

Base Metal Ions on Metal Surfaces and Determination of the "Absolute" Surface by Means of Radioactive Indicators.) W. Herr. *Angewandte Chemie,* Sec. A, v. 59, May-June 1947, p. 155-157.

Methods and results of measurements for Pb on Ag, Pb on Ni, Pb on Hg, and Bi on Ag.

11-304. Uber die Kontraste von Atomen in Elektronenmikroskop. (Concerning the Development of Atomic Contrast in Electron Microscopy.) Hans Boersch, *Zeitschrift fur Naturforschung,* v. 2a, Nov.-Dec. 1947, p. 615-633.

Methods for developing contrast. Advantages of the phase-contrast method in electron microscopy. Further development of the dark-field method is recommended. 22 ref.

11-305. The Dissolution of Gold in Cyanide Solutions. P. F. Thompson. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 41-69; discussion, p. 70-71.

Previously abstracted from preprint. See item 6-177, 1947.

11-306. Quantitative Metallography by Point-Counting and Lineal Analysis. R. T. Howard and M. Cohen. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 413-426; discussion, p. 426.

Previously abstracted from *Metals Technology,* v. 14, Aug. 1947, TP 2215. See item 11-154, 1947.

11-307. The Factorial Experiment in Engineering Research. M. K. Barnett. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 427-438.

Previously abstracted from *Metals Technology,* v. 14, June 1947, TP 2161. See item 11-83, 1947.

11-308. A New Method for Making Rapid and Accurate Estimates of Grain Size. F. C. Hull. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 439-451.

Previously abstracted from *Metals Technology,* v. 14, July 1947, TP 2160. See item 11-82, 1947.

11-309. A Diffusion Method for Determining the Austenitic Grain Size of Steel. Earl J. Eckel and Stan J. Paprocki. *Transactions of the American Society for Metals,* v. 41, 1949, p. 1204-1212.

Bronze is diffused intergranularly into the steel at the austenitizing temperature. A regular metallographic polish followed by a 4% picral etch develops a clear, high-contrast microstructure which may be easily evaluated and photographed. Results check well with those obtained by other methods.

11-310. Simple Electrolytic Polishing Procedures for Molybdenum Metallographic Specimens. William C. Coons. *Transactions of the American Society for Metals,* v. 41, 1949, p. 1415-1424.

Procedures developed for both sintered and cast molybdenum specimens. Actual polishing time required is approximately 1.5 min. The apparatus is simple, consisting merely of two to six 1½-volt dry cells connected in series, a 200-cc. porcelain dish, a stainless steel cathode, and a bare-end copper wire as the anode lead for contacting the specimen. Electrolyte compositions and two new methods for etching Mo are also proposed.

SECTION XII

INSPECTION AND STANDARDIZATION

12a—General

12a-1. Measuring Large Precision Parts. N. N. Sawin. *Machinery* (London), v. 71, Nov. 13, 1947, p. 541-544.

Results of experiments designed to develop a satisfactory procedure.

12a-2. Testing of Flatness by the Beam Comparator Method. R. Marriener and W. O. Jennings. *Machinery Lloyd* (Overseas Edition), v. 19, Nov. 22, 1947, p. 99-102.

Method developed in Britain during the war for testing quickly and with reasonable accuracy large batches of plates of the same size.

12a-3. Portable Ultrasonic Thickness Gage. Norman G. Branson. *Electronics*, v. 21, Jan. 1948, p. 88-91.

Instrument by which thickness of empty or full pipes and tanks, or metal sheets, is quickly measured to 1% accuracy. A frequency-modulated oscillator provides an audible indication of plate-current peaks when the oscillator is tuned to fundamental or harmonic thickness resonance with material under test. Indicating dial shows steel thickness directly.

12a-4. Inspection and Testing. *Steel*, v. 122, Jan. 5, 1948, p. 211-212, 215.

Brief reviews of recent developments: Industrial X-Ray Saves Manufacturer $250,000, by R. G. Tobey; X-Rays Gage Hot Strip Steel During High-Speed Rolling, by W. C. Hutchins; Recognizes Importance of Basic Government Research, by George Sachs; Surface Roughness Measurement by Facsimile Eliminates Dispute, by J. Manuele; Spectrochemical Analysis Now by Direct Intensity Measurement, by W. B. Coleman; Use of Statistical Methods Grows as Inspection Tool, by J. R. Steen; Servo-Mechanism With Recorder Weighs Mine Cars in Lengths, by W. R. Daniels; Oxygen in Openhearth Sets Need for Closer Charge Control, by Charles R. Funk; Predicts 2% of Gross Sales to be Earmarked for Research, by C. O. Dohrenwend; Sees Buyers' Market in Very Near Future, by Sam Tour.

12a-5. X-Ray Inspection of Spot Welds. Robert C. McMaster. *Welding Engineer*, v. 33, Jan. 1948, p. 54-58.

Nondestructive radiographic inspection which can be carried out at any point in the fabrication process as applied to nearly all sheet metals.

12a-6. The Inspection of Spot Welds. *Machinery Lloyd* (Overseas Edition), v. 19, Dec. 6, 1947, p. 68-72.

General principles of spot welding and inspection methods. Practical applications for mild steel and aluminum alloys. The "Metroflux", captive-fluid, magnetic-detector cell for testing spot welds in stainless steels.

12a-7. Checking Angle Gages During Manufacture. E. S. Tebbutt. *Machinery* (London), v. 71, Dec. 4, 1947, p. 630.

12a-8. Acceptance Standards in Radiographic Examination of Castings and Welds. *Engineer*, v. 184, Dec. 12, 1947, p. 551.

Summarizes the discussion which took place at a meeting of the Industrial Radiology Group of the Institute of Physics, London, Nov. 8, 1947.

12a-9. Defects and Preventives in Weld Radiographs. *Iron Age*, v. 161, Jan. 15, 1948, p. 73. Reprinted from article by L. Mullins, *Transactions of the Institute of Welding*, Oct. 1947.

A tabulation.

12a-10. Checking Internal Gear Sizes by Measurement Between Wires. Even Numbers of Teeth. Odd Numbers of Teeth. *Machinery* (London), v. 71, Dec. 18, 1947, p. 698; Dec. 25, 1947, p. 724.

Two tables.

12a-11. Fixtures for Casting Qualification. Part II. A Program for Casting Qualification. A. H. Blacker. *Tool & Die Journal*, v. 13, Jan. 1948, p. 52-55, 92, 94.

Planning the program and design of the fixtures.

12a-12. Air Jets; Their Characteristics for Gaging Devices. R. S. Elberty. *Machine Design,* v. 20, Jan. 1948, p. 111-114.

Fundamental principles.

12a-13. X-Ray Gaging of Sheet and Strip Thickness. *Iron Age,* v. 161, Jan. 29, 1948, p. 69, 127.

Gage developed by Westinghouse Electric permits continuous measurement, roll-pressure control, and classification of metal sheet and strip. Other thickness-gaging uses are suggested.

12a-14. Lot Sampling of Screw Machine Parts. G. M. Bowen. *Iron Age,* v. 161, Jan. 29, 1948, p. 74-76.

A plan which reduces over-all defective volume by 28% and holds defectives to 2%. It also permitted a cut of more than 60% in inspection personnel.

12a-15. Gear Measurement Over Nonstandard Pins. Edward J. Rantsch. *American Machinist,* v. 92, Jan. 29, 1948, p. 301.

How to use nonstandard pins when standard ones are not available for checking gears during cutting or inspection.

12a-16. X-Ray Thickness Control Expected to Step Up Sheet Output. W. N. Lundahl. *Steel,* v. 122, Feb. 2, 1948, p. 101-102, 117-118.

Equipment which automatically rejects off-gage material in flying-shear installations or controls screwdowns to maintain uniform thickness in material coming off the cold mill. Potentialities for other uses.

12a-17. Identify Casting Defects. J. O. Vadeboncoeur. *American Foundryman,* v. 13, Jan. 1948, p. 56-59.

Methods used to identify the various types.

12a-18. A World Standard for Screw Threads. Kaare Heiberg. *Journal of Scientific and Industrial Research,* v. 6A, Sept. 1947, p. 351-358.

Problems involved in unifying the three systems now in use, proposed solutions, and the work which has been done along these lines. The differences between the British and American systems added over one billion dollars to the cost of World War II.

12a-19. Gear Tooth Inspection Method as an Index of Performance. L. D. Martin. *Product Engineering,* v. 19, Feb. 1948, p. 87-89.

Inspection data obtained by the pin-measurement method and the master-gear or rack method for checking the accuracy of gear-tooth elements.

12a-20. Gage-Zone System Harmonizes Delivery and Acceptance Inspection. John Gaillard. *American Machinist,* v. 92, Feb. 12, 1948, p. 100-105.

Proposed system of inspection assures that parts made to the vendor's gages will always pass the customer's gages.

12a-21. Electronic Inspection. *Aircraft Production,* v. 10, Feb. 1948, p. 52-54.

Principles and applications of the Cornelius comparator for checking structure, composition, flaws dimensional variations, hardness, surface-finish comparison, and stress-strain analysis.

12a-22. Importance of Radiography to Inspection. E. L. LaGrelius. *American Foundrymen's Assoc., Preprint No.* 47-16, 1947, 4 pages.

Application in foundry practice.

12a-23. One-Millionth Second Radiography and Its Development. Charles M. Slack and Louis F. Ehrke. *ASTM Bulletin,* Jan. 1948, p. 59-68.

The great reduction in exposure times which has been made since Roentgen's period and particularly the latest development which permits radiographs to be made through reasonable thicknesses of metal in one-millionth of a second. 11 ref. (Presented at joint Symposium on Ultra-High Voltage Radiography of A.S.T.M. Committee E-7 on Radiography and of the American Industrial Radium and X-Ray Society, Cleveland, Feb. 8, 1946.)

12a-24. Frankford Arsenal Experience With High-Speed Radiography. E. R. Thilo. *ASTM Bulletin,* Jan. 1948, p. 69-72.

(Presented at Symposium on Ultra-High Voltage Radiography sponsored jointly by A.S.T.M. Committee E-7 on Radiography and American Industrial Radium and X-Ray Society, Cleveland, Feb. 8, 1946.)

12a-25. Het Niet-Destructief Materiaalonderzoek. (Nondestructive Testing of Materials.) J. W. Holleman and W. A. Schultze. *Metalen,* v. 2, Jan. 1948, p. 93-97.

Nondestructive test methods usually applied in the control of technical materials. Possibilities and limitations of each method. Use of ultraviolet light in detecting cracks. 9 ref.

12a-26. Report of Committee on Standards for Machined Surface Finishes. Hugh B. Conover. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 62-63, 65.

Includes A.I.S.E. Standard No. 3.

12a-27. Table of Weights for Elliptical Bars. *Foundry,* v. 76, March 1948, p. 118.

Weights of elliptical bars of cast

iron, steel, aluminum, copper, zinc, gun metal, and yellow brass in 1-in. lengths.

12a-28. Inspection Methods Using Magnaflux and Zyglo in Production Industries. W. E. Thomas. *Non-Destructive Testing,* v. 6, Fall 1947, p. 9-14.

Methods and their practical applications; a few of the general principles which apply in factory inspections; and how these methods are being applied in production. (Presented at National Conference on Production Inspection With Magnaflux and Zyglo, Detroit, Nov. 10-11, 1947.)

12a-29. Use of Radon for Industrial Radiography. A. Morrison. *Non-Destructive Testing,* v. 6, Fall 1947, p. 24-26. Reprinted from *Canadian Journal of Research,* v. 23, Sec. F, Nov. 1945.

12a-30. Precision Radiography at Two-Million Volts. E. Alfred Burrill. *Non-Destructive Testing,* v. 6, Fall 1947, p. 42-45, 47, 51. Based on Final Report of the M.I.T. Project in High Voltage Radiography, O.S.R.D. Report No. 4488, June 1945.

12a-31. Gaging of Precision Screw Threads. A. C. Pruliere. *Microtechnic,* v. 1, Dec. 1947, p. 126-129. (For figures see French section, p. 281-287.) Translated from the French.

Definitions relative to screw threads and the different American, British, and Continental standards. History of development of the various types and their standardization. Errors in threads and their significance. (To be continued.)

12a-32. The Comparator, Its Use, Its Working. B. Humbert. *Microtechnic,* v. 1, Dec. 1947, p. 131-134. (For figures see French section, p. 290-299.) Translated from the French.

A detailed description of the mechanisms of dial gages, especially Swiss ones.

12a-33. X-Ray Thickness Gage. W. N. Lundahl. *Western Metals,* v. 6, Feb. 1948, p. 48, 50-51.

New Westinghouse gage now operating on cold-rolled steel sheet and cold-rolled copper and believed applicable to other metallic and non-metallic raw materials.

12a-34. Measuring Thickness Without Contact. Walter N. Lundahl *Westinghouse Engineer,* v. 8, March 1948, p. 42-43.

Electronic method developed at Westinghouse. (Condensed from paper presented at A.I.E.E. Midwinter Convention, Pittsburgh, Jan. 26-30, 1948.)

12a-35. Some Engineering Aspects of Quality Control. A. G. Dalton. *Mechanical Engineering,* v. 70, March 1948, p. 205-207, 225.

Presented at Annual meeting, A.S.M.E., Atlantic City, Dec. 1-5, 1947.

12a-36. Development of A.S.A. Standard for Slotted and Recessed Screw Heads B18.6-1947. F. P. Tisch. *Fasteners,* v. 4, no. 4, 1948, p. 10-12.

Report by Chairman of Subcommittee no. 3 of the Sectional Committee on the Standardization of Bolt, Nut and Rivet Proportions.

12a-37. Decimal Equivalents of Various Gages. *American Machinist,* v. 92, March 25, 1948, p. 135.

12a-38. La Normalisation en Soudure; Soudage par Resistance. (Standardization in Welding; Resistance Welding.) A. Gaubert. *Soudure et Techniques Connexes,* v. 2, Jan-Feb. 1948, p. 34-35.

Tentative definitions and conditions for resistance welding. Comments are requested before May 31, 1948, when they will become official.

12a-39. Radioactive Isotopes as Sources in Industrial Radiography. Gerold H. Tenney. *U. S. Atomic Energy Commission,* MDDC-1690, Jan. 29, 1948, 21 pages.

Elementary principles, and experiments in which radio-lanthanum was used as source of radiation. Characteristic curves for radiography of steel up to a thickness of 5¼ in. were developed.

12a-40. Sigma Electropneumatic Gage. *Machinery* (London), v. 72, Feb. 19, 1948, p. 236.

System for measurement of holes which are inaccessible or too small to permit other mechanical or electrical methods of gaging.

12a-41. Characteristics of Some Non-screen Films Used in Industrial Radiology. R. L. Durant. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, March 1948, p. 105-110.

In the past, difficulties due to lack of flexibility in control of both contrast and speed of X-ray films have been encountered. Results of investigation show that a much wider range of film speed and contrast can be obtained. In extreme cases speed ratios of 400:1, and contrast ratios of 5:1 are obtainable by modification of the time of development alone. Applications to practical radiography are considered.

12a-42. The Detection of Cracks by X-Rays and Gamma Rays. C. Croxson. *Electronic Engineering,* v. 20, April 1948, p. 106-111.

An illustrated survey. (Based on a lecture given at Symposium on

Methods of Crack Detection, Industrial Radiology Group, Institute of Physics, July 1947.)

12a-43. Precision Measurement. Part II. Zeiss Gear-Tooth and Cam Checking Machines; Leitz Drill-Spotting Instrument: Carl Mahr Dial Micrometer. S. C. Poulsen. *Aircraft Production,* v. 10, April 1948, p. 126-129.

12a-44. Producer's Quality Control Report Aids Inspection of Incoming Parts. G. R. Armstrong. *Machinery* v. 54, April 1948, p. 162-165.

Use of frequency-distribution charts.

12a-45. Let the Machine Talk. C. W. Kennedy. *Tool Engineer,* v. 20, April 1948, p. 17-20.

A number of simple time-saving sampling and statistical techniques for using machine samples to forecast quality and anticipate inaccuracies. These techniques can be applied without use of intricate mathematics.

12a-46. New Standards Set the Pace for Fine-Pitch Gearing. Louis D. Martin. *Electrical Manufacturing,* v. 41, April 1948, p. 80-84, 135.

A review of what has been accomplished and a projection of new developments in standards and equipment for producing this specialized type of gearing, made by the chairman of the A.G.M.A. Fine-Pitch Gearing Committee.

12a-47. X-Ray Thickness Gage for Cold Rolled Strip Steel. W. N. Lundahl. *Electrical Engineering,* v. 67, April 1948, p. 349-353. A condensation.

Details of construction and circuits of an X-ray thickness gage for cold mill and other applications utilizing one photoelectric multiplier pickup and two X-ray sources. Range is 0.005 to 0.050 in. with accuracies up to 1%. (Presented at A.I.E.E. winter general meeting, Pittsburgh, Jan. 26-30, 1948.)

12a-48. Thickness Gaged by X-Ray. W. N. Lundahl. *Enamelist,* v. 25, April 1948, p. 32-35, 38.

Previously abstracted from *Electrical Engineering,* v. 67, April 1948, p. 349-353. See item 12a-47, 1948.

12a-49. Gaging of Precision Screw Threads. A. C. Pruliere. *Microtecnic,* v. 2, Feb. 1948, p. 33-41. (Translated from the French).

Gives data on profiles of Whitworth, Sellers, D.I.N., and S.I. threads. Mechanical, optical, and electrical methods. (To be continued)

12a-50. Statistical Quality Control for the Shop Man. C. W. Kennedy. *Tool & Die Journal,* v. 14, May 1948, p. 52-57.

Recommended methods, including calculation, are described in detail. (Condensed from lecture before New York City Section, American Society for Quality Control, Nov. 21, 1947.)

12a-51. Shop-Run Tolerances. Part I. L. M. Nielsen. *Product Engineering,* v. 19, May 1948, p. 142-144.

Advantages of standards and how they are established. Tolerance tables for iron castings, blanked and pierced parts, and parts bent on dies and bending machines.

12a-52. Radiographic "Relief" Printing. A. J. Weston. *Metal Industry,* v. 72, April 30, 1948, p. 344.

Photographic technique for soldered articles which shows defects clearly even to those unaccustomed to interpreting radiographs.

12a-53. Specifications for Electroplated Metals. *Metal Finishing,* v. 46, May 1948, p. 85.

A.S.T.M., A.M.S., Army-Navy, and Navy Dept. specifications for Cd, Zn, Ni, Ni + Cr, hard Cr, Sn, Pb, Pb-In, and Ag plates.

12a-54. New Detector for Weld Flaws. *Production Engineering & Management,* v. 21, May 1948, p. 55.

Supersonic reflectoscope.

12a-55. Quality Control Increases Overall Efficiency. C. W. Mihle. *Production Engineering & Management,* v. 21, May 1948, p. 69-71.

How salvage has been reduced and product output increased.

12a-56. Gage Control and Measuring Techniques. Philip G. Fishback. *Tool Engineer,* v. 20, May 1948, p. 25-30.

Use in manufacture of camera mechanisms.

12a-57. Advancement in Industrial Radiography. Gerold H. Tenney. *U. S. Atomic Energy Commission,* MDDC-1491: LADC-420, Dec. 5, 1947, 3 pages.

12a-58. A Inspecao de Pecas Metalicas Pelos Raios-Gama. (Inspection of Metal Castings by Means of Gamma Rays.) Carlos de Revoredo Barros and Victor Lo Ré. *Boletim da Associacao Brasileira de Metais,* v. 4, Jan. 1948, p. 36-49.

Method and results of comparative study of X and gamma-rays. The latter are recommended for industrial use.

12a-59. The Standards Department—Its Organization and Function. Paul R. Godfrey. *Iron Age,* v. 161, May 27, 1948, p. 78-83, 148.

Contributions a standards department can make in reducing manufacturing costs and improving quality.

12a-60. Quality Control—The Preventative Medicine of Industry. L. Kasper. *Modern Machine Shop,* v. 21, June 1948, p. 124-130, 132, 134, 136, 138, 140.

12a-61. Process Control Steps-up Production, Cuts Costs. *SAE Journal,* v. 56, June 1948, p. 24-27. Excerpts from "Production Process Control, What It Can Do for Quality, Costs, and Volume," by R. H. McCarroll.

Examples of the use of statistical quality control in the foundry, in forging, in plating, and in cold-heading.

12a-62. Quality Control in a Tractor Plant. Joseph Geschelin. *Automotive Industries,* v. 98, June 1, 1948, p. 34-35, 66, 68, 70.

Adaptation of statistical methods to small-lot operations with highly beneficial results.

12a-63. Gaging and Metrology. John E. Sears. *Institution of Mechanical Engineers, Proceedings,* Vol. 157, War Emergency Issue No. 32, 1947, p. 298-301.

A review of progress in the above practice.

12a-64. Supersonic Inspection. *Welding Engineer,* v. 33, June 1948, p. 33.

Newly developed testing technique employing high-frequency supersonic waves entering the welded part at an angle. It is a modification of the technique of the Sperry Supersonic Reflectoscope and is known as angle-beam transmission. It can be applied to the inspection of welds in plate, thin sheets, or sections where shape or contour is more or less uniform, and also inspection of internal defects. It is applicable to both ferrous and light metals.

12a-65. Bore Inspection. *Aircraft Production,* v. 10, June 1948, p. 187-188.

New method for fine measurement of interrupted and soft-surfaced bores.

12a-66. Controlling Quality in Castings Production. V. A. Simpson and G. K. Eggleston. *American Foundryman,* v. 13, June 1948, p. 55-56.

A new approach to the problem of maintaining cooperation between production, metallurgical and inspection personnel, in their combined attempt to keep quality up and costs down.

12a-67. Testing Welds With Supersonic Waves. Benson Carlin. *Welding Journal,* v. 27, June 1948, p. 438-440.

Newly developed "angle beam" transmission technique in connection with a conventional Supersonic Reflectoscope.

12a-68. Shop-Run Tolerances. Part II. L. M. Nielsen. *Product Engineering,* v. 19, June 1948, p. 141-145.

Data for parts produced on screw machines and general machine-shop equipment. Eccentricity and angularity tolerances for parts threaded on screw machines.

12a-69. Flow Inspection Cuts Rejects 90 Per Cent. *Factory Management and Maintenance,* v. 106, July 1948, p. 72-74.

Use of conveyors has made possible the inspection of precision parts within minutes after machining in a diesel-fuel-pump machine shop.

12a-70. How International Nickel Makes Precision Investment Castings. *Steel,* v. 123, July 5, 1948, p. 72-75.

12a-71. Electronic Counter. *Metal Industry,* v. 72, June 25, 1948, p. 527.

Construction of an ingenious machine for the counting of small objects of similar size, such as nuts and bolts.

12a-72. High Precision Surface Finish Standard to be Offered Metal Processing Industry. Clayton R. Lewis and Arthur F. Underwood. *Steel,* v. 123, July 19, 1948, p. 90-92, 124.

How the problem of making a master set of standard surface-finish specimens was solved after two years' study by G. M. and Chrysler engineers. Newly designed fine-line ruling machine will rule grooves in a polished specimen up to 10,000 lines per in. while holding pitch accurate to $\pm 2\%$.

12a-73. X-Ray Thickness Gauge. W. N. Lundahl. *Radio-Electronic Engineering,* v. 10 (Bound with *Radio News,* v. 39), June 1948, p. 14-15, 29.

Previously abstracted from *Electrical Engineering,* v. 67, April 1948, p. 349-353. See item 12a-47, 1948.

12a-74. Eddy Current and Electrical Method of Crack Detection. A. M. Armour. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 209-210.

The principles of eddy-current crack-detection methods. Anomalies due to edge effects, sectional changes, and applicator attitude. Typical apparatus. Suggestions offered for further research on crack-testing nonmagnetic conductors. The electrical resistance method and examples of its successful application.

12a-75. Gauging of Precision Screw Threads. (Continued.) A. C. Pruliere. *Microtechnic,* v. 2, April 1948, p. 71-78. Translated from the French.

Zeiss measuring prism method, optical method, optical-mechanical method, and wire method. (To be continued.)

12a-76. Resonant Frequency as a Means of Inspection. Edward Epremian. *Metal Progess,* v. 54, July 1948, p. 64.

Method of striking with a hammer and listening to find out whether the object "rings true" is replaced by using a tachometer, coil magnet, or oscilloscope to measure the frequency of a part which can be vibrated.

12a-77. The Value of Scientific Inspection to Industry. William Hitt. *Western Machinery and Steel World,* v. 39, July 1948, p. 108-113; discussion, p. 113.

Use of Zyglo, fluoroscopic, and magnaflux inspection.

12a-78. Radiographic Practice at Ford. David Goodman. *Iron Age,* v. 162, July 22, 1948, p. 90-94.

X-ray techniques used for inspection, process development, applied physics research, and other purposes. The success of radiography in reduction of costs and the use of X-ray and electron diffraction in studying surface stresses.

12a-79. Economic Aspects of Radio-Frequency Heating. Lawrence M. Duryee. *Electrical Engineering,* v. 67, Aug. 1948, p. 747.

A condensation.

12a-80. The Proficorder—An Instrument for Recording Waviness and Other Surface Profiles. E. J. Abbott and Edward Rupke. *Transactions of the American Society of Mechanical Engineers,* v. 70, May 1948, p. 263-269; discussion, p. 269-270.

The instrument reproduces, with appropriate magnifications, the actual profile of a considerable length of surface. It permits the study of individual irregularities as to size, shape, and relative position with respect to other irregularities.

12a-81. Radiographic Control of Welded Repairs in Steel Castings. R. Halmshaw, *Welding,* v. 16, July 1948, p. 284-290.

Application of radiographic inspection to castings both for detection of defects and control of subsequent repair by welding. Techniques involved for examination and elimination of flaws encountered. Arguments for and against use of gamma-radiography in this type of work.

12a-82. Line Weld Checking with Portable X-Ray Unit. Elton Sterrett. *World Oil,* v. 128, Aug. 1948, p. 195-196, 200-201.

Development of a mobile unit for transporting an X-ray tube within a line pipe and its use in accurate checking of the entire circumference of a weld. Provides any desired degree of completeness in determining the joining abutting joints of pipe.

12a-83. Better Production Control With Electronic Inspection. Alexander Maxwell. *Production Engineering & Management,* v. 22, Aug. 1948, p. 63-66.

Caging, sorting and segregation of workpieces at speeds up to 20,000 parts per hour is practical with high-frequency electronic equipment with assured accuracy of ± 0.00001 in.

12a-84. Standards for Magnetic Particle Inspection. Donald E. Roda. *Iron Age,* v. 162, Aug. 12, 1948, p. 82-89.

Fundamental concepts upon which acceptance and rejection of parts should be based. The two principal types of defects, cracks and inclusions, are discussed as to cause and effect, means of identification under magnetic inspection, and metallographic examination. A listing of nine classifications into which inspection standards are grouped in the aircraft industry, supplemented with a photographic study illustrating the various classifications.

12a-85. Some Crack Detection Methods. Horace Manley. *Metallurgia,* v. 38, July 1948, p. 165-168.

Most important nondestructive methods developed and applied for the detection of internal flaws in ingots, forgings, castings and other metal products.

12a-86. Gaging Three-Fluted Tools. Ernest Fiedler. *Screw Machine Engineering,* v. 9, Aug. 1948, p. 34-35.

12a-87. Radioactive Isotopes as Sources in Industrial Radiography. Gerold H. Tenney. *Non-Destructive Testing,* v. 6, No. 4, Spring, 1948, p. 7-10.

Reviews basic facts of radioactivity and their application in field of metallurgy. Experiments on steel.

12a-88. Gauges in Modern Manufacturing. H. Kieffer. *Microtecnic* (English edition), v. 11, June 1948, p. 109-114. (Translated from the French.)

Advantages and disadvantages of the various systems.

12a-89. Gauging of Precision Screw Threads. A. C. Pruliere. *Microtecnic* (English edition), v. 11, June 1948, p. 115-122. (Translated from the French.)

Concludes descriptions of the various optical, optical-mechanical, and mechanical methods. Description of a simple mechanical device for measurement of the difference between desired and actual values of thread pitch. 20 ref.

12a-90. Metallurgical Control in Aircraft. *Western Machinery and Steel World,* v. 39, Aug. 1948, p. 100-103.

Methods for checking raw materials against a specification as done by a production metallurgist in an aircraft factory. Use of the spectrograph as an instrument for quality control.

12a-91. Acceptance Standards in Radiographic Inspection. C. Croxson. *Welding,* v. 16, Aug. 1948, p. 324-329.

A critical review makes reference to both American and German practices.

12a-92. Engineers Seek Uniformity in Nondestructive Testing. *SAE Journal,* v. 56, Sept. 1948, p. 25-26, 40. Based on "Application of Nondestructive Testing to Automotive Parts", by D. M. McCutcheon.

Problems involved in standardization of test methods.

12a-93. Is Statistical Quality Control of Value in Manufacturing? *American Machinist,* v. 92, Sept. 9, 1948, p. 86-87.

"No!" says Chief Tool Engineer Bryan D. Miller, who relates an actual experience and comes forth with an indictment. "Yes!" says quality Control Engineer Clifford W. Kennedy, who comments on the experience and defends the statistical method.

12a-94. How to Specify Surface Quality. J. F. Fischer. *Machinery,* v. 55, Sept. 1948, p. 174-177.

Details of application of American Standard (Part I of A.S.A. B46. 1-1947) entitled, "Surface Roughness, Waviness, and Lay."

12a-95. How Smooth is Smooth? Specification and Evaluation of Machined Finishes. Ben C. Brosheer. *American Machinist,* v. 92, Sept. 9, 1948, p. 97-112; Sept. 23, 1948, p. 111-122.

Details of various methods for the above and of the different standard specifications, specimen blocks, and measuring and inspection equipment. Part II deals with optical comparators. 113 ref.

12a-96. Supersonics Versus Radiography. Herbert R. Isenburger. *Metal Progress,* v. 54, Sept. 1948, p. 318.

Recommends supplementing the former method of weld inspection by the latter.

12a-97. Locating Cavities in Test Disks. Henry Thompson. *Metal Progress,* v. 54, Sept. 1948, p. 347.

Modified print method used in combination with normal sulphur printing.

12a-98. Cam Contour Gage. E. A. Mercier. *Screw Machine Engineering,* v. 9, Sept. 1948, p. 41.

12a-99. Turbine-Blade Inspection; Production Gauging by Optical Projection. S. C. Poulsen. *Aircraft Production,* v. 10, Sept. 1948, p. 291-294.

Method and equipment.

12a-100. Alignment Testing. Part I Accurate Establishment and Checking of Large Dimensions; Some Instruments in Current Use. K. J. Hume. *Aircraft Production,* v. 10, Oct. 1948, p. 351-353.

12a-101. Inspecting Turbine Blades; New Electrical Equipment; Light-Signal and Dial Indications. *Aircraft Production,* v. 10, Oct. 1948, p. 354-355.

12a-102. Practicing What We Preach. Clifford W. Kennedy. *Tool & Die Journal,* v. 14, Oct. 1948, p. 59-64.

Quality-control procedures of Federal Products Corp., one of the leading exponents of such practices.

12a-103. Controlling Surface Finish to Specified Quality Standards. Roger F. Waindle. *Tool & Die Journal,* v. 14, Oct. 1948, p. 66-70.

Methods used by Elgin National Watch Co.

12a-104. Gage Control. W. D. Angst. *Tool & Die Journal,* v. 14, Oct. 1948, p. 72-78, 84.

Applications at Thompson Products' Cleveland plant.

12a-105. Quality Control at Jack & Heintz. Jack L. Shafer. *Tool & Die Journal,* v. 14, Oct. 1948, p. 80-84.

12a-106. Quality Control Through Statistical Methods. F. C. Schulze. *Tool & Die Journal,* v. 14, Oct. 1948, p. 88-90, 92.

Methods used by Hunter Spring Co., Lansdale, Pa.

12a-107. Angle Inspection of Lamination Tooling. *Tool & Die Journal,* v. 14, Oct. 1948, p. 94, 96.

Methods for inspection of tools and dies used in manufacture of electric motor laminations.

12a-108. Unilateral Tolerances for Drilled and Reamed Holes. E. A. Ryder. *Tool Engineer,* v. 21, Oct. 1948, p. 27-28.

When tolerances are all in one direction, they are called "unilateral tolerances". This principle, and recommended tolerances.

12a-109. Non-Destructive Testing in the Design, Manufacture and Evaluation of Naval Ordnance. Leslie W. Ball. *Non-Destructive Testing,* v. 7, Summer 1948, p. 7-14.

With special reference to the work of the U. S. Naval Ordnance Laboratory. Work done there.

12a-110. Plain and Tapered Rings and Plugs, Precision Measurement of Circularity, Concentricity and Straight-

ness. M. J. Puttock. *Machinery* (London), v. 73, Oct. 7, 1948, p. 533-535.

New devices developed give accuracies of 0.00001 in. circularity, 0.000015 in. concentricity, 0.00001 in. straightness, and 0.000015 in. parallelism.

12a-111. Ultrasonic Thickness Indicator. Benson Carlin. *Electronics,* v. 21, Nov. 1948, p. 76-79.

Nondestructive testing and gaging device which gives visual display. Equipment comprises motor-driven variable frequency oscillator, contactor-initiated R-C sweep, crystal transducer, and cathode-ray tube Graduated screens provide direct readings.

12a-112. Colored Magnetic Powders for the Inspection of Obscure Parts by the Suspension Method. (In Russian.) A. V. Zhigadlo. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 942-948.

Improvements in the method of inspecting finished and semifinished metal parts by the use of light-colored magnetic powders retained on the surface by oil-base resins or lacquers.

12a-113. A Comparator for Measuring the Diameters of Small Holes. E. R. Dymott and W. O. Jennings. *Machinery* (London), v. 73, Oct. 31, 1948, p. 590-591.

Apparatus measures the diameters of ring gages and holes from 0.5 in. down to 0.1 in. by comparison with slip gages. It has been found to give results accurate to ± 0.00003 in.

12a-114. Production Inspection of Valve Parts. *Tool & Die Journal,* v. 14, Nov. 1948, p. 50, 52-54.

12a-115. Tools for Dimensional Quality Control. O. H. Somers. *Tool Engineer,* v. 21, Nov. 1948, p. 31-32.

Principles.

12a-116. Quality Control Fundamentals. Bruno A. Moski, Jr. *Factory Management and Maintenance,* v. 106, Nov. 1948, p. 136, 138.

In summary form.

12a-117. Statistical Methods and Engineering Processes. Bernard P. Dudding and W. J. Jennett. *Engineering,* v. 166, Oct. 22, 1948, p. 405-407; Oct. 29, 1948, p. 429-430. A condensation.

Their scope in relation to the engineering industries.

12a-118. Proposed Gage Manufacturing Tolerances. Gilbert A. Marshall. *Machinery,* v. 55, Dec. 1948, p. 175-178.

Intended as an introduction to the problem, and not as a complete analysis.

12a-119. Machinery's Data Sheets 623 and 624. *Machinery,* v. 55, Dec. 1948, p. 245.

Dimensions of standard keyway broaches.

12a-120. Designating Surface Roughness With the Aid of Geometric Standards. Clayton R. Lewis and Arthur F. Underwood. *Machine Design,* v. 20, Dec. 1948, p. 137-140.

Previously abstracted from *Steel,* v. 123, July 19, 1948, p. 90-92, 124. See item 12a-72, 1948.

12a-121. Ultrasonic Weld Inspection Facilitated by Angle Beam Searching Unit. *Steel,* v. 123, Dec. 13, 1948, p. 98, 100, 103.

Instrument which tests for lack of bond, inclusions, or voids when placed on parent metal adjacent to or within 3 to 6 in. of the weld.

12a-122. Quality Control Methods Brought Down to Earth. Irving W. Burr. *American Foundryman,* v. 14, Dec. 1948, p. 43-47.

Methods as applied in the foundry.

12a-123. Production Data Sheet; Length of Metal Required for Right Angle Bend When Radius and Thickness Are Known. A. C. Siegel. *Production Engineering & Management,* v. 22, Dec. 1948, p. 71.

12a-124. Weight Tables for Screw-Machine Products. *American Machinist,* v. 92, Dec. 16, 1948, p. 135, 137, 139.

Developed from mill-run samples. No reliance was placed on theoretical densities of materials. Thus, they are based on the actual densities of a specific kind of steel, of brass, and of aluminum.

12a-125. Importance of Radiography to Inspection. E. L. LaGrelius. *Transactions of the American Foundrymen's Assocation,* v. 55, 1947, p. 375-378; discussion, p. 378-380.

Previously abstracted from preprint. See item 12a-22, 1948.

12a-126. New Tentative Standards for Grading and Fineness of Sands. R. E. Morey. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 381-386; discussion, p. 386-387.

Previously abstracted from preprint. See item 14a-30, 1948.

12b—Ferrous

12b-1. First Progress Report on Nondestructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster, T. P. Nordin, and G. T. Muehlenkamp. *Drilling Contractor,* v. 4, Dec. 15, 1947, p. 54-55, 72.

American Association of Oilwell Drilling Contractors has authorized

Battelle Memorial Institute to conduct an investigation of methods for nondestructive testing of oil-well drill pipe. The facilities and research program.

12b-2. Special Tools Torsion-Test Lockwashers Correctly. H. Greenberg. *American Machinist,* v. 92, Jan. 15, 1948, p. 87.

Simple apparatus claimed to give correct and reproducible results superior to the S.A.E. "vise and monkey wrench" method.

12b-3. Standard Stainless Steels, Wrought and Cast. *Metal Progress,* v. 53, Jan. 1948, p. 96B.

A tabulation.

12b-4. Notes on Radiology of Welded Pipe Joints. *Combustion,* v. 19, Jan. 1948, p. 44.

Reviews paper by E. Thomas before the Institution of Mechanical Engineers (Great Britain.)

12b-5. Design Standards for Steel Water Pipe. Russell E. Barnard. *Journal of the American Water Works Association,* v. 40, Jan. 1948, p. 24-87.

Extensive design data for steel water pipe lines from 6 to 36 in. in diameter. 16 ref.

12b-6. General Inspection. *B.S.F.A. Bulletin,* v. 1, Jan. 1948, p. 1-7.

Recommended ferrous foundry inspection procedures.

12b-7. A.I.S.I. Standard Alloy Steel Compositions; Openhearth and Electric Furnace Alloy Steels (Bars, Billets, Blooms and Slabs). *Metal Progress,* v. 53, Feb. 1948, p. 240B.

List includes Oct. 1947 revisions.

12b-8. Report of Activities of A.I.S.E. Standardization Committee—1947. Frank W. Cramer. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 60-62.

(Presented at A.I.S.E. annual convention, Pittsburgh, Sept. 23, 24, 1947.)

12b-9. Report of Committee on Sling and Crane Chain Standards. J. B. Mitchell and J. F. Byers. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 63, 66-68; discussion, p. 63.

Includes A.I.S.E. Standard No. 4.

12b-10. A.I.S.E. Standard No. 5; Standards for Wiring Diagrams. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 69-70.

Diagrams for all controls designed especially for steel-mill service.

12b-11. Mill Motor Brake Standardization. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 71-75; discussion, p. 75-77.

Three short papers as follows: Effect of Proposed New Aisle Mill Motors on Motor Brake Design, by A. H. Myles; Aisle Mill Motors and Brake Standardization, by John A. Cortelli; and Effect of WR^2 on Brake Design, by A. E. Lillquist. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 23, 1947.)

12b-12. Contribucao Para Uma Especificacao de Gusa. (Specifications for Cast Iron.) Yves Mathieu, Baldassare Mattana, and Grovanne B. Giuliani. *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 719-733; discussion, p. 733-749.

The various cast-iron compositions are tabulated, charted, and discussed at length by a group of engineers.

12b-13. The Value of High Voltage X-Ray in Automotive Parts. E. H. Grimm. *Non-Destructive Testing,* v. 6, Fall 1947, p. 20-21.

Use by Auto Specialties Mfg. Co., St. Joseph, Mich., in production of cast-steel crankshafts and malleable-iron castings as well as hydraulic and mechanical jacks.

12b-14. Field Inspection of Drill Strings; Second Progress Report on Nondestructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster, and T. P. Nordin. *Drilling Contractor,* v. 4, Feb. 15, 1948, p. 52-57.

During a six-week field trip in the Permian Basin, West Texas oil fields, Battelle engineers observed field inspection of drill strings and collected joints containing defects, for use in developing nondestructive test methods. Observations on present field-inspection practices, and examples of defects observed in the field.

12b-15. A Visual Aid for Inside Inspection of Drill Pipe; Third Progress Report on Nondestructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster and T. P. Nordin. *Drilling Contractor,* v. 4, Feb. 15, 1948, p. 58-60.

A simple optical device which consists essentially of a sectional pole carrying a light source and a 45° conical mirror. Such devices may be constructed quickly and at low cost, are light-weight and portable, and provide clear images of the defects.

12b-16. X-Ray Gaging of Strip Steel With Phototubes. *Electrical Manufacturing,* v. 41, March 1948, p. 105-107, 192, 194, 196.

Two new electronic instruments are analyzed, one designed primarily for application to hot-roll mills, the other to cold-roll stands.

12b-17. Quality Control Helps Make Better Rivets. Herbert Schneider. *Fasteners,* v. 4, no. 4, 1948, p. 4-7.

Effects of cold drawing and of variations in annealing times and temperatures on physical proper-

ties. These effects are illustrated by photomicrographs, and manufacturing procedures are briefly described, including pickling.

12b-18. A New Machine Bolt Specification. A. D. Morris. *Fasteners,* v. 4, no. 4, 1948, p. 13-15.

A.S.T.M. tentative specification for steel machine bolts and nuts and top bolts.

12b-19. How to Cut Unnecessary Costs. I. Injuries in Ground Surfaces. L. P. Tarasov. *Steel,* v. 122, March 22, 1948, p. 71-74, 76, 79.

How to detect and recognize injuries due to cracks, stresses, or burns resulting from grinding of hard steel, including toolsteels, carburized steels, and cemented carbides; how to decide whether or not the trouble is serious enough to affect useful life of the part; and how to track down and eliminate the principal cause or causes of defects.

12b-20. Recommended Practices for Staybolt Application and Maintenance. *Master Boiler Makers' Association, Official Proceedings of the 1947 Annual Meeting,* 1947, p. 118-152; discussion, p. 152-165.

A survey of tolerances for taps and staybolts, by G. R. Greenslade; a discussion of inspection gages for screw thread, by W. C. Masters; and the following papers: Boiler Practice and Material Specifications, S. E. Christopherson; Comments Concerning Practice of a Manufacturer Relating to Application of Staybolt in New Boilers, R. J. McNamara; Application and Maintenance of Staybolt, W. H. East; and Following Practices of Staybolt Application, Erie Railroad, S. S. McConnell.

12b-21. Supersonic Pulses Probe Metals to Hunt Flaws, Check Thickness. H. C. Drake and E. W. Moore. *Aviation Week,* v. 48, March 22, 1948, p. 21-23.

Use of above to detect internal defects in high-strength propeller steel and to gage thicknesses accurately.

12b-22. A Comparison of X-Ray and Gamma-Ray Methods for Testing Steel Castings. *Foundry Trade Journal,* v. 84, March 18, 1948, p. 270.

A statement, by the Steel Castings Division of the British Iron and Steel Research Assoc.

12b-23. The Administration of Inspection and Dispatch in a Steel Wire Mill. C. Coates. *Wire and Wire Products,* v. 23, April 1948, p. 307-310, 346-348.

Organization and procedure.

12b-24. Standard Carbon and Free Cutting Steels. *Metal Progress,* v. 53, April 1948, p. 544-B.

A tabulation showing compositions of S.A.E. and A.I.S.I. designations, revised Oct. 30, 1947.

12b-25. Statistical Analysis for Quality Control of Forgings. E. W. Mace. *Steel Processing,* v. 34, April 1948, p. 193-197.

Information presented is mainly connected with drop-forging effects of such factors as depth of dies, die wear, the human element, performance of different machines, and machine maintenance and wear.

12b-26. Nondestructive Testing of Steel Castings; Report of the Steel Division Committee of A.F.A. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 574.

New developments between April 1946 and April 1947. Annotated bibliography consisting of 12 items.

12b-27. The Specification and Testing of Cast Iron. Arthur B. Everest. *Foundry Trade Journal,* v. 84, April 1, 1948, p. 317-321.

How British Standards specifications for cast iron are formulated. (Presented to London Branch, Institute of British Foundrymen.)

12b-28. Tentative Industrial Radiographic Standards for Steel Castings. A.S.T.M. Designation: E 71-47 T; Issued 1947. *Foundry,* v. 76, May 1948, p. 199-200.

12b-29. A Survey of Patents, Publications on Nondestructive Tests; Fourth Progress Report on Nondestructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster and T. P. Nordin. *Drilling Contractor,* v. 4, April 15, 1948, p. 64-75.

Significant features of nondestructive test methods described in more than 200 patents and about 200 technical articles. The patented methods are classified by the nature of the energy field established in the test object, or by the method of measurement. The principle of operation of each method, novel features and applications of the significant patents. Several hundred references.

12b-30. Tubular-Goods Testing Device Gives Good Field Results; Used on Stanolind's Deep Oklahoma Producer. Leigh S. McCaslin, Jr. *Oil and Gas Journal,* v. 47, May 6, 1948, p. 83-84.

Results of field tests on the Sclerograph which operates on magnetic and ultrasonic principles. It will determine the tensile strength of tubular goods and also locate slag intrusions, laminations, and holes.

12b-31. Continuous Noncontact Gaging of Hot Strip. *Iron Age,* v. 161, May 6, 1948, p. 78.

Use of X-ray thickness gage as described at recent A.I.E.E. meeting by C. W. Clapp and R. V. Pohl.

12b-32. Naval Radiographical Laboratory to Assist Welding and Casting Technique. A. Wilson. *Metallurgia,* v. 37, April 1948, p. 305-306.

British Navy's laboratory facilities.

12b-33. Iron and Steel Specifications in Russia. *Metallurgia,* v. 37, April 1948, p. 319-320.

American methods seem to have been largely adopted in Russia, according to recently published Russian technical literature. Specifications indicate that Mn in steel compositions is used more than in England or in the U. S. whereas Mo and Co are used less. Significance of the various symbols used to designate compositions of steels and cast irons in Russia. This information is invaluable for those attempting to use the Russian metallurgical literature.

12b-34. Magnetic Particle Inspection of Silver-Plated or Phenolic Resin Coated Steel. V. H. McBride. *Metal Progress,* v. 53, May 1948, p. 691-692.

It was found that 0.0015-in. plate thickness is the maximum at which all discontinuities are indicated using the wet continuous method, and 0.001-in. using the wet residual method. Smooth phenolic coatings also cause an unstable pattern of the magnetic particles, requiring inspection prior to their application.

12b-35. Tentative Hardenability Bands, 1320H to 4132H. *Metal Progress,* v. 53, May 1948, p. 696B.

First of a series of data sheets covering new tentative S.A.E. and A.I.S.I. specifications.

12b-36. The Spectrograph as an Aid to Quality Control. Hubert Swett. *Western Metals,* v. 6, May 1948, p. 40-42.

12b-37. The Practical Application of Hardenability Specifications. H. B. Knowlton. *Iron Age,* v. 161, June 3, 1948, p. 72-77, 158, 160.

Practical significance of minimum hardenability in regulating physical properties, and also the relation of minimum hardenability to per cent martensite. Effect of tempering on hardenability and recommends measurement of this relationship in the hardenability test specimens.

12b-38. High Duty Cast Iron in Great Britain. (In English.) A. B. Everest. *Metalen,* v. 2, May 1948, p. 193-194.

Deals mainly with specifications. (Summary of a lecture.)

12b-39. Specificatie en Normalisatie van stalen Walsproducten. (Specifications for Normalization of Rolled Steel Products.) P. M. Waszink. *Metalen,* v. 2, May 1948, p. 196-202.

Development of specifications for steel products which achieve a satisfactory compromise between the interests of the producer and the consumer. 11 ref.

12b-40. Magnaflux Inspection of Car Parts. R. H. Herman. *Railway Mechanical Engineer,* v. 122, June 1948, p. 86-88.

Use by Southern Railway.

12b-41. Two Million Volt X-Ray Machine. *Welding Journal,* v. 27, June 1948, p. 476.

Instrument to examine welds in high-pressure, high-temperature boiler drums.

12b-42. Tentative Hardenability Bands, 2135 H to 4340 H. *Metal Progress,* v. 53, June 1948, p. 840-B.

A data sheet.

12b-43. Faster Steel Cutting Promoted by Electric Measuring Gage. *Steel,* v. 123, July 19, 1948, p. 113.

Two installations of the device, on a saw and on a shear, have proved successful over a period of years.

12b-44. Radiology of Joints in Welded Piping for Power Plants. E. Thomas. *Institution of Mechanical Engineers Proceedings,* v. 158, June 1948, p. 1-5; discussion p. 5-8.

Methods and equipment for large and small pipes, and methods for evaluating the radiographs.

12b-45. Tentative Hardenability Bands, 4620 H to 6150 H. *Metal Progress,* v. 54, July 1948, p. 64-B.

A series of charts.

12b-46. Comparative Tool Steel Brands. *Iron Age,* v. 162, July 29, 1948, p. 79-81.

Tables list comparable trade names of toolsteels of 16 producers. Classifications used are the new A.S.M. classifications, (see page 656, 1948 "Metals Handbook"), with the exception of the carbon toolsteel grade.

12b-47. Machine Screw Taps. *American Machinist,* v. 92, July 29, 1948, p. 127.

Standards for regular and spiral-pointed tabs.

12b-48. Magnetic Particle Inspection in Engineering. Donald E. Roda. *Iron Age,* v. 162, Aug. 5, 1948, p. 79-83.

The important role played by magnetic inspection as a supplement to

other testing procedures in the quality control of aircraft components and weld sections. A description of the equipment used and of the methods followed in detecting various types of defects is presented and the need for establishment of inspection standards emphasized. A convenient method for recording results of magnetic inspection tests.

12b-49. Gamma-Ray Radiography in a Steel Foundry. Robert A. Willey. *Non-Destructive Testing,* v. 6, no. 4, Spring 1948, p. 15-18.
Various examples and problems which led to development of a radiographic procedure at the Commercial Steel Casting Co., Marion, Ohio.

12b-50. Power Plant Pipe Welds; Radiographic Examination on Site. James F. Magee. *Welding,* v. 16, Aug. 1948, p. 330-334.
Views of an Australian power-plant purchaser on the question of the site use of radiographic examination of welds in high-pressure steam pipes.

12b-51. Standards for Welds in Ship Construction; Present Scope of Radiographic Inspection. R. J. W. Rudkin. *Welding,* v. 16, Aug. 1948, p. 335-338.
Believes that before acceptance standards can be formed for welded joints in complex structures such as ships, a very much greater knowledge is required of the effect of various defects, and of different proportions, on the load-carrying capacity of the joints used.

12b-52. Radiological Standards for Pipe Welds; Comments and Recommendations. W. J. Wiltshire. *Welding,* v. 16, Aug. 1948, p. 339-345.
Satisfactory examination techniques. Believes that there is no reason why standards for pipe welds should be lower than those for pressure vessels and draws attention to the need for more correlation of weld defects with the flaws shown by radiography.

12b-53. Welds in Armour; The Search for Standards. O. E. Chapman, and R. W. Angle. *Welding,* v. 16, Aug. 1948, p. 345-349.
The special difficulties associated with radiographic examination of armor plate welds. Other forms of nondestructive examination.

12b-54. Supersonic-Radiographic Inspection. *Production Engineering & Management,* v. 22, Sept. 1948, p. 56.
Recommends use of combination of the two types for best results. On completion of supersonic inspection of butt welding in pressure containers, the most defective portions (about 10%) were given a radiographic check, since the supersonic method gives little quantitative information concerning the nature and extent of defects.

12b-55. Inspection of Precision Aircraft Gears. D. W. Dudley. *Machinery,* v. 55, Sept. 1948, p. 151-157.
Methods and equipment used by General Electric to check high-speed gears for aviation gas turbines.

12b-56. Experience With "H" Band Hardenability Specifications for Automotive Steels. *Steel Processing,* v. 34, Sept. 1948, p. 491-494.
Report of Steel Users Subcommittee, Hardenability Division, Iron and Steel Technical Committee, AISI. Answers to a questionnaire indicate that considerable improvement has been made in the elimination of the small percentage of heats formerly found incapable of responding satisfactorily to production heat treatments because of low hardenability. Use of hardenability does not change average performance of steel parts, but does eliminate heats having very high or low hardenabilities which would have been accepted under chemical-analysis specifications.

12b-57. Tentative Hardenability Bands, 8642 H to 8742 H. *Metal Progress,* v. 54, Sept. 1948, p. 344-B.

12b-58. Proposed Tentative API Standard on Steel Well-Head Equipment. *Proceedings, American Petroleum Institute,* v. 27, (IV), 1947, p. 251-254.
Recommended practice for welding of pipe to well-head parts for pressure seal.

12b-59. Electric Current Conduction Tests. Fifth Progress Report on Non-Destructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster, and T. P. Nordin. *Drilling Contractor,* v. 4, Aug. 15, 1948, p. 68-72.
Preliminary results of exploratory trials of an electric-current-conduction type of nondestructive test, for detection of fatigue cracks. Tests indicate that the method has some promise for checking the extent and depth of cracks revealed by magnetic particle inspection, without the necessity for grinding or filing such areas excessively. It does not appear to be readily suited for over-all inspection of drill pipe with dirty or scaled surfaces. 43 ref.

12b-60. X-Ray Proving of Welded Structures. *Gas Journal,* v. 255, Sept. 8, 1948, p. 520-521.
Methods and equipment.

12b-61. Automotive Steel Users Report Experience with H-Band Specs. *SAE Journal,* v. 56, Oct. 1948, p. 17-19, 64.

Committee report presents results of a survey which indicates wide acceptance of hardenability specifications since three years ago, when only one manufacturer was using them. Now 22 out of 27 users make some use of them.

12b-62. Inspection of Master Form Crusher Rolls. *Tool & Die Journal,* v. 14, Oct. 1948, p. 86-87.

Inspection at a company which specialized in the manufacture of master form-crusher rolls. Used to dress grinding wheels which produce thread-rolling dies, form tools and centerless-ground threaded workpieces.

12b-63. A Pig With an X-Ray Eye. Elton Sterrett. *Welding Engineer,* v. 33, Oct. 1948, p. 56-57.

In pipe-line parlance, a unit designed to move within a pipe bore is known as a "pig". The one described carries equipment for X-ray inspection of welded joints.

12b-64. Why Can't Closer Tolerances be Held for Coiled Springs Commercially? *Mainspring,* v. 12, Oct. 1948, p. 1-4.

A manufacturer gives his answers.

12b-65. Standard Grades of Pig Iron, American Iron and Steel Institute. *Foundry,* v. 76, Oct. 1948, p. 125-126.

Development of the standards, classifications and definitions. Compositions of the low-phosphorus (0.035% max.) and intermediate low-phosphorus (0.036-0.075%) groups. (To be continued.)

12b-66. Use of Filters in Million-Volt Radiography. G. M. Corney. *Non-Destructive Testing,* v. 7, Summer 1948, p. 23-28.

Steel samples of thicknesses varying from ½ to 4 in. were radiographed using lead filters varying from 0.015 to ¼ in. thick. Advantages and disadvantages.

12b-67. Sensitivity and Exposure Graphs for Radium Radiography. H. E. Johns and C. Garrett. *Canadian Journal of Research,* v. 26, sec. A, Sept. 1948, p. 292-305.

Radiography of steel by gamma rays from radium. Thickness of lead front screen which yields the maximum intensifying effect; action of the front screen. Sensitivity curves were obtained using a slotted-wedge steel penetrameter for a number of the commonly used types of X-ray film.

12b-68. Tentative Hardenability Bands, 8745 H to 9445 H. *Metal Progress,* v. 54, Oct. 1948, p. 488-B.

12b-69. Optical Projector for Pipe Inspection; Sixth Progress Report on Non-Destructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster, and T. P. Nordin. *Drilling Contractor,* v. 4, Oct. 15, 1948, p. 84-86.

Device which provides a full-size image of the internal surface of oil-well drill pipe, which may be viewed binocularly at a comfortable viewing distance.

12b-70. "H" Band Hardenability Specifications Favorably Received by Users of Automotive Alloy Steels. *Steel,* v. 123, Nov. 1, 1948, p. 81, 120, 122.

Good practical results after 3½-years experience with S.A.E-A.I.S.I. method of ordering steels by hardenability as well as by chemical analysis.

12b-71. The Measurement of Errors in Gears for Turbine Reduction Drives. C. Timms. *Institution of Mechanical Engineers, Proceedings,* War Emergency Issue No. 35, 1947, p. 418-432; discussion, p. 432-451.

The relationship between these errors and the inaccuracies of gear-hobbing machines and gear-cutting hobs. Improvements which have taken place in the accuracy of these machines and cutting tools resulting from applications of the test methods described.

12b-72. Inspecting Oldsmobile's New V-Eight Engine. S. C. Starnaman. *Machinery,* v. 55, Nov. 1948, p. 184-193.

Unique inspection machines which automatically gage cylinder bores and pistons, simultaneously classifying them for selective assembly. Highest quality is insured without sacrificing mass production of the new high-compression engine.

12b-73. Cutting Piston Inspection Costs in Half. *Automotive Industries,* v. 99, Nov. 1, 1948, p. 40.

Continuous, high-speed, automatic method for magnetic inspection of pistons. The system will be also applied to other parts.

12b-74. Specifications for High Tensile-Strength Music Spring Wire. *Machinery* (American), v. 55, Nov. 1948, p. 271.

12b-75. Standard Grades of Pig Iron; American Iron and Steel Institute. (Continued.) *Foundry,* v. 76. Nov. 1948, p. 125-126.

Compositions for several classes of low and high-phosphorus pig iron. (To be continued.)

12b-76. Weld Inspection by Combining Both Supersonic and X-Ray Methods. Herbert R. Isenburger. *Chemical Engineering,* v. 55, Nov. 1948, p. 155-156.

Advantages of combination procedures for low-carbon steel welds.

12b-77. Case Hardness "Pattern". F. V. Horak. *Metal Progress,* v. 54, Nov. 1948, p. 686.

Tempering at 950° F. enables parts to be sawed readily. A light grind or polish smoothes the surface for etching. An ammonium persulphate etch brings out the originally hardened zone in sharp contrast to the unhardened core.

12b-78. Using the Scleroscope for Testing the Depth of Shallow, Hardened Cases. B. Z. Berman. *Metal Progress,* v. 54, Nov. 1948, p. 688.

Tests were made only on sheet metal screws, cyanided and then quenched in cold water. However, the method also should be useful for testing many light-case parts and particularly nitrided parts.

12b-79. Fits, Tolerances and Finishes. Myles F. Harr. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 87-92; discussion, p. 92-93.

How standardization of fits, tolerances, and finishes developed by A.S.A. and A.I.S.E. is resulting in plant economies.

12b-80. Standard Grades of Pig Iron; American Iron and Steel Institute. *Foundry,* v. 76, Dec. 1948, p. 137.

12b-81. Metallurgical Control of Deep Drawn Stampings From Cold Rolled Steel. Part II. N. E. Rothenthaler. *Tool & Die Journal,* v. 14, Dec. 1948, p. 46-48, 50-51.

Metallurgical control group of Ford Motor Co. observes and records daily steel performance on all deep-drawing operations. Any disturbing factor which is causing poor performance is quickly determined and adjustment is made.

12b-82. H-Band Steels Aid Heat Treaters. D. H. Ruhnke, E. T. Walton, and P. R. Wray. *Steel,* v. 123, Dec. 13, 1948, p. 88-90, 115.

Development of hardenability bands, principles and methods of use, and experiences of users. Advantages.

12b-83. Standard Grades of Ferroalloys; American Iron and Steel Institute. *Foundry,* v. 76, Dec. 1948, p. 138.

Description and tabular material. (To be concluded.)

12b-84. Field Experience on Gamma Ray Inspection of Welds in a High Pressure Pipe Line. A. B. Lauderbaugh and S. A. Brosky. *Gas Age,* v. 102, Dec. 9, 1948, p. 25-27.

12b-85. Practical Inspection Lowers Scrap and Rework. Jack Shafer. *American Machinist,* v. 92, Dec. 16, 1948, p. 112-115.

System by which defects have been cut as much as 85%.

12b-86. Supersonic Testing of Steel. R. R. Webster. *Yearbook of the American Iron and Steel Institute,* 1947, p. 558-578; discussion, p. 578-579.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 12-94, 1947.

12b-87. Selection and Application of Statistical Methods to Steel Plant Processing Problems. E. L. Robinson. *Yearbook of the American Iron and Steel Institute,* 1947, p. 539-556; discussion, p. 556-557.

Previously abstracted from preprint. See item 12-95, 1947. (Presented at A.I.S.I Meeting, New York, May 21-22, 1947.)

12b-88. A New Type of Magnetic Flaw Detector. Carlton H. Hastings. *American Society for Testing Materials, Proceedings,* v. 47, 1947, p. 651-659; discussion, p. 660-664.

Previously abstracted from preprint. See item 12-150, 1947.

12b-89. Castings Industry Applications of Magnetic Particle Inspection. W. E. Thomas. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 482-488; discussion, p. 489.

Previously abstracted from *American Foundryman,* v. 11, April 1947, p. 104-110. See item 12-72, 1947.

12c—Nonferrous

12c-1. The Proving of New Dies for Die Casting. *Machinery* (London), v. 71, Dec. 25, 1947, p. 738.

Recommended inspection procedures.

12c-2. The Radiography of Heavy Radioactive Metals. Gerold H. Tenney. *Atomic Energy Commission,* MDDC 478; LADC 310, Nov. 13, 1946, 20 pages.

A method for radiographic inspection of uranium. A resolution of 2½% up to thicknesses of 4 in. was obtained, which was adequate for detection of air bubbles (the usual defect).

12c-3. A Commentary on the New British Standard on Definitions of Trade Terms for Some Nonferrous Wrought Products. D. C. G. Lees. *Metal Treatment,* v. 14, Winter 1947-48, p. 199-201.

New standard definitions attempt to reduce confusion in the metal-producing and metalworking industries concerning terms such as "sheet", "wire", "bright rolled finish".

12c-4. How Westinghouse Standardized Single-Point Carbide Tools. J. C. Gumpper and T. Badger. *Machinery,* v. 54, March 1948, p. 162-167.

12c-5. What Do You Know About Zyglo? R. O. Schiebel. *Industry and Welding,* v. 21, April 1948, p. 30-32, 36, 56, 58.

A nondestructive inspection method designed for nonmagnetic and nonferrous materials—aluminum, bronze, magnesium, manganese, and stainless steels.

12c-6. Nominal Chemical Compositions of Standard Copper Alloys. *Materials & Methods,* v. 27, April 1948, p. 107.

Data contributed by Non-Ferrous Ingot Institute.

12c-7. Production Data Sheet: Comparison Chart of Cemented Carbide Grades. *Production Engineering & Management,* v. 21, May 1948, p. 73.

12c-8. Radiographic Tests of Gun Metal Castings. William H. Baer. *Non-Destructive Testing,* v. 6, no. 4, Spring 1948, p. 33-39.

Inspection technique in identification of various typical defects.

12c-9. Radiography of Gun-Metal Castings. William H. Baer. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 153-158; discussion, p. 159.

Various defects were investigated and correlated with foundry practice. See item 12-71, 1947.

12d—Light Metals

12d-1. Crack Detection. A. J. Weston. *Metal Industry,* v. 72, Feb. 6, 1948, p. 108.

Use of the chalk test for very fine cracks in light-alloy die castings has not always been satisfactory. Use of Wood's metal impregnation under pressure followed by radiography was also unsatisfactory for very fine cracks on account of high surface tension. Various other types of substances were also unsuccessfully used before an iodized popyseed oil sold under the name "Neo-Hydriol" was found to be the ideal medium.

12d-2. Short Source-Object Distance Exposure Techniques in Spot Weld Radiography. R. C. McMaster, F. C. Lindvall, and J. W. Smith. *Non-Destructive Testing,* v. 6, Fall 1947, p. 31-37.

Gives practical instructions for use of S.O.D. exposure techniques which reduce spot weld X-ray exposure times to 1 to 2 sec. 12 ref. (Presented at 6th annual convention, American Industrial Radium and X-ray Society, Atlantic City, Nov. 20-22, 1946.)

12d-3. The Radiographic Inspection of Jet-Engine Aluminum Alloy Castings. W. A. Mader. *Foundry Trade Journal,* v. 84, March 18, 1948, p. 267-269.

12d-4. Radiographic Appraisal of Spot Welds in Aluminum. Gerard H. Boss. *Metal Progress,* v. 53, April 1948, p. 522-527, 566.

Second portion of a critical resumé of publications concerning wartime work on spot welding.

12d-5. Current Light-Alloy Specifications; Corrected to February, 1948. *Light Metals,* v. 11, April 1948, p. 216-224.

British specifications. Includes compositions.

12d-6. Production Hardness Testing Speeds Manufacture of Aluminum Extrusion and Tube Products. Owen Lee Mitchell. *Steel,* v. 122, May 3, 1948, p. 104, 126.

Webster Model B hardness testers are used.

12d-7. Quality Control of Aluminum Sheet. Amiel Gelb. *Iron Age,* v. 161, May 13, 1948, p. 72-77.

Application of hardness testing for quality control of aluminum sheet has made possible significant savings in cost of routine inspection. The Brinell hardness test was found unsuitable for this purpose, but the Rockwell test proved satisfactory. Data are presented for conversion from one Rockwell scale to another and for correlating tensile strength with hardness.

12d-8. Aluminum Alloy Control With the Quantometer. C. J. Clausen, Jr. *Western Metals,* v. 6, May 1948, p. 26-29.

Use in rolling-mill laboratory.

12d-9. Tentative Specifications For Aluminum-Base Alloy Sand Castings: ASTM Designation: B26-47T *Foundry,* v. 26, June 1948, p. 227-228.

12d-10. Tempers for Aluminum Alloys. *American Machinist,* v. 92, July 1, 1948, p. 129, 131.

Tables for the heat treatable wrought alloys and those not heat treatable, as an aid in correlating alloy designations with the old and new temper designations for the various forms of stock.

12d-11. Temper Designations for Aluminum Alloy Mill Products. *Reynolds Metals Technical Advisor,* v. 1, No. 8, p. 1-3.

New additions and revisions of above system.

12d-12. Radiography as a Control in Aluminum Alloy Spot Welding and the Fabrication of Plastic Honeycomb Panels for Aircraft. Floyd Chitty. *Non-Destructive Testing,* v. 6, no. 4, Spring 1948, p. 11-12.

Technique developed by Glenn L. Martin Co.

12d-13. Kontrola vyroby hlinikové folie röntgenovymi paprsky. (Control of the Production of Aluminum Foil by Means of X-Rays.) Petr Skulari. *Hitnické Listy,* v. 3, April-May 1948, p. 116-120.

Proposes several methods for X-ray analysis of the microstructure of the above foil which enables one to judge the quality of the finished product and to predict the behavior of the foil in practical application.

12d-14. Temper Designations for Aluminum Alloys. *Materials & Methods,* v. 28, Sept. 1948, p. 105.

12d-15. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, Oct. 1948, p. 74-75, 230, 232, 234, 236, 238, 240.

Methods of inspection for possible defects. Sponsored by the Foundry Division of the Aluminum Association.

SECTION XIII

TEMPERATURE MEASUREMENT AND CONTROL

13-1. A Note on Optical Pyrometry. Robert Weil. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 415-416.

The effect of variation with temperature of emissivity. Under certain circumstances it may be possible to express this variation in terms of changes of electrical resistivity in the near infrared and visible parts of the spectrum.

13-2. Roof Pyrometers. T. Land. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 559-561; discussion, p. 629-631.

A photo-electric type for openhearth furnaces.

13-3. Instrumentation; Control of Openhearth Furnaces. G. Reginald Bashforth. *Iron and Steel,* v. 20, Dec. 1947, p. 639-643.

The pros and cons of use of instruments for combustion control; reversal control; roof-temperature control; and furnace-pressure control. Principles of some of the devices and systems.

13-4. An Alternating Current Potentiometer of the Polar Type Together With an Alternating Current "Standard Cell". F. H. Gage and G. J. Phillips. *Philosophical Magazine,* 7th Series, v. 38, June 1947, p. 398-408.

Phase-splitting and phase-shifting circuits. An a.c. "standard cell" of the thermal type. Adjustment and calibration of the complete instrument. 11 ref.

13-5. Stralingspyrometrie. (Radiation Pyrometry.) H. C. den Daas and F. van Wijk. *Metalen,* v. 2, Nov. 1947, p. 45-49.

Methods used in optical and radiation pyrometry. Results with different types.

13-6. The Embrittlement of Chromel and Alumel Thermocouple Wires. W. I. Pumphrey. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 513-514.

Embrittlement at temperatures above 800° C. in uncleaned stainless steel protecting sheaths. Oil or other carbonaceous or sulphur-bearing matter remaining in the protecting tube after manufacture may be the cause of the embrittlement; all stainless steel sheaths for use with chromel-alumel thermocouples should be thoroughly cleaned before use.

13-7. Sur la Determination Rapide de la Temperature de Recristallisation des Alliages. (Rapid Determination of Recrystallization Temperature of Alloys). Pierre Laurent and Michel Eudier. *Comptes Rendus* (France), v. 225, Nov. 24, 1947, p. 1011-1012.

Use of a thermocouple composed of a tempered wire and a cold-worked wire of the same metal to determine the recrystallization temperature of Cu-Zn alloys. An emf. is set up by such a combination.

13-8. Pyrometry for the Ceramic Industries; With an Introduction to Principles of Automatic Control. V. L. Parsegian. *American Ceramic Society Bulletin,* v. 27, Jan. 15, 1948, p. 1-24.

Recommended practices and sources of error in temperature measurement, together with a brief review of automatic-controller principles and types. 37 ref. (Presented at the 49th Annual Meeting, American Ceramic Society, Atlantic City, N. J., April 23, 1947.)

13-9. Automatic Temperature Control in the Finishing Department. Frank V. Faulhaber. *Products Finishing,* v. 12, Feb. 1948, p. 18-20, 22, 24, 26, 28.

General recommendations.

13-10. Measurement of Gas Temperatures by Means of Thermocouples. W. L. Bolles. *Petroleum Refiner,* v. 27, Feb. 1948, p. 94-100.

Chemists and engineers all too frequently ignore the large errors which are likely to occur. Danger of error, methods for estimating the extent of error, practical methods of

reducing it, and the principal methods used.

13-11. Temperature Control in Openhearth Furnaces. (In Russian). V. S. Kocho. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1209-1215.

Various methods were investigated. Results indicate that the highest possible temperature should be maintained just below the center of the crown. Diagrams show construction and location of suitable apparatus for determining the temperature at this point and also the radiation of the flame.

13-12. Measurement of Temperature by Means of Resistance Thermometers Made of Semiconductors. (In Russian) B. T. Kolomiets and I. T. Sheftel. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Oct. 1947, p. 1105-1110.

Proposes use of UO_2 the resistance of which changes markedly with temperature. Methods for production of such thermometers and data on their characteristics and performance.

13-13. Instruments, Furnace Control and Heat Treatment. *Metal Treatment,* v. 14, Winter 1947-48, p. 197-198.

13-14. Items of Controllability in the Openhearth Combustion Process. A. J. Fisher. *Yearbook of the American Iron and Steel Institute,* 1947, p. 201-232; discussion, p. 232-233.

Various types of control instruments and systems used at Sparrows Point, Md., plant of Bethlehem Steel. (Presented at A.I.S.I. meeting, New York, May 21-22, 1947.)

13-15. Temperature Control of Electrically Heated Gas Carburizing Furnaces. *Instrumentation,* v. 3, 1st Quarter, 1948, p. 21.

13-16. Determination of the Temperaature in the Region Just Below the Crown of Coking Furnaces. (In Russian.) B. I. Kustov, A. I. Voloshin, and I. A. Kopeliovich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, 1947, p. 1459-1462.

These temperatures are important for control of coking furnaces. Investigation showed that retained heat radiated from the crown causes a considerable lag in the indications of thermocouples located just under the crown. Recommends placing the couples further down between the crown and the top of the charge.

13-17. Measurement of the Temperature of Railway Brake Blocks. R. C. Parker and P. R. Marshall. *Engineering,* v. 165, Jan. 2, 1948, p. 21-22; Jan. 9, 1948, p. 45-48. Condensed from paper presented to Institution of Mechanical Engineers, London, Nov. 7, 1947.

Various methods which have been used to measure the surface temperatures of bearing surfaces. The method used is based on measurement of emitted radiation. Results obtained for a "black body", for oxidized steel, and for bright steel. Test apparatus and results of an investigation of the effects of various factors.

13-18. The Embrittlement of Chromel and Alumel Thermocouple Wires. *Wire Industry,* v. 15, Feb. 1948, p. 113. Based on paper by W. I. Pumphrey, *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 513-514.

Previously abstracted from original paper. See item 13-6, March 1948 issue of Metals Review.

13-19. Surface Temperature Measurement. M. Diana Hedgcock and R. Mayorcas. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 236-247.

Methods of measuring surface temperature which have particular reference to the requirements of the steel industry. Theoretical considerations; descriptions and evaluations of the various methods including several recent developments. 15 ref.

13-20. Maintenance of Temperature Indicating and Recording Instruments. Harry C. Morrow. *Iron and Steel Engineer,* v. 25, March 1948, p. 93-96.

Methods used at the sheet and tin mills, Carnegie-Illinois Steel Corp., Gary, Ind.

13-21. Improving Temperature Compensation of Recording Pyrometers. Paul Lincke. *Instruments,* v. 21, March 1948, p. 246.

One of the principal faults of millivoltmeter pyrometers using a bimetallic spiral to compensate for ambient temperature changes is that the compensation is accurate at only one point on the scale. Negative-temperature-coefficient resistance units made it possible to do this in a highly satisfactory manner. By using only a portion of the bimetallic spiral sufficient to shift the open-circuit zero point an amount on the scale or chart equivalent to the change in ambient temperature, and by using a negative-temperature-coefficient resistant unit to compensate at the upper end, excellent compensation is achieved over the entire range.

13-22. Bath Temperature Measurements. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining*

and Metallurgical Engineers, v. 30, 1947, p. 252-254.

Experiences with different methods and apparatus.

13-23. Temperature Scale of the Blowing-Tube Bath Pyrometer. L. O. Sordahl and J. W. Bain. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 255-260.

Methods used and results obtained in determination of deviations from the true temperature scale, using a quick-immersion thermocouple method. First, comparative radiation and optical pyrometer readings were made. On calibration of the blowing-tube pyrometer against the quick-immersion thermocouple good agreement was obtained at 2600° F.; but linear divergence occurred with increasing temperatures up to a 66° variation at 3000° F. Effect of substituting nitrogen for oxygen for purging the tube was determined, and it was found that the substitution resulted in practical elimination of the error above 2600° F.

13-24. A Comparison of the Pt-PtRh Thermocouple With the Optical Pyrometer for Temperature Measurements in Liquid Steel. G. R. Fitterer and J. W. Linehart. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 289-297.

Simultaneous comparative tests were obtained with each instrument on seven plain-carbon heats of acid openhearth steel. The tests were taken at two periods of the heats. Comparison of simultaneous temperatures showed consistently higher temperatures of 35 to 50° F. for the optical pyrometer. Emissivities were recalculated and found to vary between 0.428 and 0.495 instead of the 0.40 usually assumed. The relation of emissivity to other factors is tabulated in an attempt to determine the reason for the variations. It is shown that optical-pyrometer spoon temperatures are relative to true temperatures, if properly taken and may be correlated with practical metallurgical data.

13-25. Inspection of Pressure Vessels and Tanks. A. P. Maradudin. *Western Metals,* v. 6, April 1948, p. 23-26.

Use of magnaflux and Zyglo for welded vessels.

13-26. Labile Thermoregulator. (In Russian.) K. G. Kumanin. *Zhurnal Prikladnoi Xhimii* (Journal of Applied Chemistry), v. 20, Dec. 1947, p. 1242-1247.

A new method of thermal analysis based on the principle of automatic retention of constant temperature differences between the wall of the furnace and the weighed portion of the investigated substance.

13-27. Progress and Pyrometry. O. B. Wilson. *Industrial Heating,* v. 15, May 1948, p. 764, 766, 768, 770.

The role of instrumentation in industry and the types of recording and controlling instruments, taking first the millivoltmeter type, then the potentiometer type, and finally modern electronic devices. (Presented at recent meeting of Berkshire Society for Metals, Pittsfield, Mass.)

13-28. Compensating Millivoltmeter Pyrometers for Ambient Temperature Changes. R. H. Grant and J. T. Cataldo. *Instruments,* v. 21, May 1948, p. 448, 450, 452, 454.

Describes construction and use as well as theory.

13-29. Design of Temperature-Measuring Elements. Mario T. Cichelli. *Industrial and Engineering Chemistry,* v. 40, June 1948, p. 1032-1039.

Methods for determining the length of temperature-measuring elements that must extend into a gaseous atmosphere to reduce the error of reading, due to conduction of heat along the unit, to less than a certain value.

13-30. Automatic Temperature Control. A. M. Adams. *British Coal Utilisation Research Association Monthly Bulletin,* v. 12, March 1948, p. 73-93.

Various methods applicable to diverse industrial processes. Circuit diagrams and an explanation of theory. 107 ref.

13-31. A High Temperature Control Circuit. Bruce C. Lutz and John H. Wood. *Canadian Journal of Research,* v. 26, sec. A, May 1948, p. 145-148.

An electronic circuit useful in the control of electric air-bath furnaces having a long time lag. It will control temperatures over 1000° C. within a precision of ± 2°C. over any desired length of time.

13-32. The Calibration of a Thermocouple. A Taylor. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 85-96; discussion, p. 97-99.

Fundamental principles of temperature measurement, followed by apparatus and procedures for calibrating various types.

13-33. Pyrometry and Its Application

in the Porcelain Enameling Industry. *Industrial Heating,* v. 15, July 1948, p. 1136, 1138. Based on talk by John R. Green.

New applications of modern pyrometry in porcelain enameling processes.

13-34. A Multi-point Furnace Control Panel. C. L. M. Cottrell. *Metallurgia,* v. 38, July 1948, p. 132-134.

When several furnaces are installed and only a few may be in use simultaneously, it is economical to group together a small number of controlling and recording instruments so that any furnace which is to be used can be easily connected to any one of the instruments. A method of achieving this.

13-35. Determination of Temperature According to the Indications of a Platinum Resistance Thermometer. (In Russian.) B. I. Pilipchuk. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 631.

A method of computing temperatures on the basis of data obtained.

13-36. A New Thermocouple Constructed of Tungsten and Graphite. (In Russian.) P. A. Shchukin and L. V. Pegushina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, May 1948, p. 632-633.

For very high temperatures.

13-37. Comparison of Systems for Controlling Gas-Fired Furnace Process Temperature. Harold E. McClatchey. *Petroleum Processing,* v. 3, Sept. 1948, p. 878-880.

Details of three methods for controlling process temperatures in a gas-fired furnace, and advantages and limitations of each.

13-38. Thermostatic Bimetals. Ernest R. Howard. *Product Engineering,* v. 19, Sept. 1948, p. 106-110.

Uses of the above for controls. Functional applications showing uses, load and deflection formulas, and time response characteristics.

13-39. The Measurement of the Temperature of Sliding Surfaces, With Particular Reference to Railway Brake Blocks. R. C. Parker and P. R. Marshall. *Institution of Mechanical Engineers, Proceedings,* v. 158, Sept. 1948, p. 209-220; discussion, p. 220-229.

Previously abstracted from condensed version under title: "Measurement of the Temperature of Railway Brake Blocks," *Engineering,* v. 165, Jan. 2, 1948, p. 45-48. See item 13-17, 1948.

13-40. Temperatures in the Open-Hearth Furnace. Robert B. Sosman. *Metals Technology,* v. 15, Aug. 1948, T.P. 2435, 37 pages.

The range of temperatures to be found in different parts of the furnace and the various methods available for their measurement. 34 ref.

13-41. Temperature Measurement; New Instruments and Developments in German Practice. *Iron and Steel,* v. 21, Sept. 1948, p. 421-423. Based on B.I.O.S. Final Report No. 1728.

Improved optical pyrometer, carbon-tube furnace with electrodes not requiring water cooling; a rotating sector; and thermosensitive paints and crayons which change color over a range of critical temperatures.

13-42. Open-Hearth Furnace Instrumentation. E. Rogers. *Journal of the Iron and Steel Institute,* v. 160, Sept. 1948, p. 57-72.

The principles which govern the application of instruments to open-hearth furnaces, and the minimum number of instruments required before an installation can be regarded as satisfactory for maximum production. However, no furnace in Britain yet possesses this desirable minimum; a few have almost the complete list, but the vast majority have only one or two. 23 ref.

13-43. Notes on the Experimental Technique of Some Physico-Chemical Measurements Between 1000° and 2000° C. J. A. Kitchener and J. O'M. Bockris. *Faraday Society Transactions, Advance Proof,* Sept. 1948, 12 pages.

The scope and limitations of some of the techniques which have been found suitable. Furnaces, temperature measurements, and laboratory refractories.

13-44. The Function of Open Hearth Instruments. II. (Concluded). G. Reginald Bashforth. *British Steelmaker,* v. 14, Oct. 1948, p. 466-468.

Regenerator temperatures and roof-temperature control.

13-45. A Simple Temperature Controller. J. C. Mouzon. *Review of Scientific Instruments,* v. 19, Oct. 1948, p. 659-662.

A controller developed for the housing of a low-temperature radiation pyrometer incorporates "proportional" control action. Utilizing a resistance thermometer element, its precision of operation is determined ultimately by the stability of the resistance element and the gain of the amplifier. Its operation is essentially independent of line voltage.

13-46. Photoelectric Pyrometer of Rap-

id Response. M. H. Roberts. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Oct. 1948, p. 337-339.

High-frequency induction heating applied to the hardening of high speed steel tools requires accurate temperature control, for which the usual types of pyrometer are unsuitable because of the rapidity of heating. A photoelectric cell of the emission type is therefore used with an interrupter in the optical path to avoid the difficulties of amplifying direct current. Output may be shown on an indicator or recorder in addition to operating a relay giving automatic control. Such pyrometers are simple and inexpensive to construct, and should be applicable to many other problems.

13-47. Apparatus and Procedure for Testing Pyrometer Switches. J. T. Cataldo and Wm. R. Dravneek. *Instruments,* v. 21, Nov. 1948, p. 1014-1015.

In connecting a number of thermocouples to a common indicating or recording instrument, multi-position selector switches are used. Efficient performance of these switches is essential but cannot be determined by ordinary voltage readings. Suitable apparatus and procedure.

13-48. Revisions for a Precision High Temperature Control Unit. Samuel Steingiser, George J. Rosenblit, and Charles E. Waring. *Review of Scientific Instruments,* v. 19, Nov. 1948, p. 815-816.

Several modifications of the circuit proposed by Waring and Robison for high-temperature furnace control, which have proven useful.

13-49. Automatic Temperature Control of Slot or Batch Type Forging Furnaces. E. A. Murphy. *Steel Processing,* v. 34, Nov. 1948, p. 609-611.

Temperature-control systems and instruments manufactured by Brown Instrument Co. and problems involved in proper control.

13-50. Electronic Controls for Regulating Temperature. Homer B. Clay. *Electrical Manufacturing,* v. 42, Dec. 1948, p. 78-82.

System developed primarily for air-conditioning service but which is also useful in other heat-control applications.

13-51. The Fundamentals of Pyrometry: I and II. W. H. Steinkamp. *Industrial Heating,* v. 15, Oct. 1948, p. 1689-1690, 1692, 1694, 1813-1817; Nov. 1948, p. 1922, 1924, 1926, 1928.

Part I consists of introduction to the subject. Part II describes specialized types of potentiometers, especially the "Electronik" instruments made by Minneapolis-Honeywell. (To be continued.)

13-52. The Influence of Smoke and Atmospheric Absorption on Optical Pyrometry in Steelworks. J. A. Hall. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 271-276.

Measurements were made of atmospheric absorption in a steel foundry and in an openhearth melting shop. Smoke from tapping or teeming operations may give rise to errors as high as 60° C. It is suggested that the correction for atmospheric absorption is likely to be between 2 and 6° C. for each 10-ft. between the pyrometer and the liquid-steel, and that the additional correction for local smoke will probably be between 5 and 15° C.

13-53. O.-H. Instrumentation; Requirements for Different Classes of Furnace. E. Rogers. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 532-540; discussion, p. 593-595.

Principles which govern the application of instruments to openhearth furnaces.

13-54. Temperaturmessfarben u. Messfarbstite. II. Anwendung. (Colors and Colored Pencils Used for Measuring Temperature. II. Applications.) Kurt Gutmann. *Archiv fur Technisches Messen,* July 1947, p. T4-T5 (4 pages). 11 ref.

13-55. A Radiation Pyrometer for Open-Hearth Bath Measurements. H. T. Clark and S. Feigenbaum. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 80-92.

Previously abstracted from *Metals Technology,* June 1946, T. P. 2031, 18 ref. See item 13-23, 1946.

13-56. Determination of Molten Metal Temperatures. G. Vennerholm and L. C. Tate. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 500-507; discussion, p. 508-509.

Previously abstracted from *American Foundryman,* v. 11, May 1947, p. 56-63. See item 13-26, 1947. Also appeared as preprint No. 47-5, 1947.

SECTION XIV

FOUNDRY PRACTICE

14a—General

14a-1. Constructing Patterns to Favor Molding. *Foundry Trade Journal,* v. 83, Nov. 13, 1947, p. 218.

Design of pattern and mold for base-frame casting.

14a-2. Plastic Patterns; Advantages and Limitations in the Metallurgical Field. E. J. McAfee. *Metal Industry,* v. 71, Nov. 21, 1947, p. 419-421.

Previously abstracted from *American Foundryman.* See 14-207, R.M.L., v. 4, 1947 (*Metals Review,* Sept. 1947).

14a-3. Metal Shrinkage. H. T. Angus. *Machinery Lloyd* (Overseas Edition), v. 19, Nov. 22, 1947, p. 68-73.

The shrinkage which takes place on solidification, from the point of view of the foundryman. The mechanism of cooling and the use of various devices for directional solidification.

14a-4. Mechanizing the Foundry. C. B. Dick. *American Foundryman,* v. 12, Dec. 1947, p. 22-31.

Examples from recent modernization of the Trafford Foundry of Westinghouse, which makes gray-iron castings. Corerooms; molding floors; baking and finishing of cores; sand supply and distribution; facilities for large molds; metal melting; finishing department; and others.

14a-5. Casting. *Steel,* v. 122, Jan. 5, 1948, p. 194-197.

Brief reviews of new developments: Predicts Better Finishes for Gray-Iron Castings, by W. L. Seelbach; Foundries Pay Attention to Basic Scientific Principles, by H. A. Schwartz; Casting Porosity Eliminated by Inert-Gas Flushing, by P. M. Hulme; Cites Advantages of Continuous Casting Copper-Base Alloys, by E. W. Lovering; Suggested Remedies to Help Overcome Foundry Handicaps, by A. W. Gregg; Foundry Research Concentrates on Reducing Over-All Costs, by Oliver Smalley; Die Casting Applications Extended to New Fields, by R. W. Dively; Higher Freight Rates Force Foundry Sand Reclamation, by John Howe Hall; Steelmaking Methods to Benefit Through Casting Research, by Charles W. Briggs; Malleable Iron Industry to Need More Pig Iron in 1948, by James H. Lansing; 1947 Die Casting Output in Excess of War Period, by Charles Pack; Cost and Scarcity of Labor Compels Operational Study, by P. J. Potter; and New Developments Noted in Ferrous Foundry Industry, by E. B. Sherwin.

14a-6. Cutting Maintenance Costs on Air Equipment. (Continued.) D. S. Linton. *Foundry,* v. 76, Jan. 1948, p. 90-93, 222, 224, 226, 228, 230, 232.

How to keep compressors and air-operated tools in proper working order. (To be concluded.)

14a-7. Mechanized Pouring in a Swedish Foundry. I. Forsland. *Foundry,* v. 76, Jan. 1948, p. 188-189.

Disputes claim that a Buick Motor Co. installation was the first of its kind in a production gray-iron foundry. A similar installation has been in use since 1934 in the SKF foundry, Katrineholm, Sweden.

14a-8. Precision Investment Casting and Its Futures. D. F. B. Tedds. *Foundry Trade Journal,* v. 83, Dec. 4, 1947, p. 281-288, 290.

Details of process using a fine refractory material which invests a wax pattern which is melted or burned away without leaving a residue. Present status and future prospects, including costs. (Presented to meeting of Bristol and West of England Branch of the Institute of British Foundrymen.)

14a-9. A New Molding Process. *Foundry Trade Journal,* v. 83, Dec. 4, 1947, p. 289-290. Based on F.I.A.T. Final Report No. 1168.

New German process for making molds and cores. The material used is high-grade silica sand and plastic binder.

14a-10. High-Speed Die Closure With Hydraulic System. *Product Engineering,*

v. 19, Jan. 1948, p. 102-103.
System for opening and closing dies at the rate of 750 in. per min. on an automatic die casting machine.

14a-11. Precision Molding. *Metal Industry,* v. 71, Dec. 19, 1947, p. 506. Based on recent F.I.A.T. Report.
Recent German developments in the production of sand molds.

14a-12. Een Methode van Kernoliezandbereiding. (A Method of Core Oil-Sand Preparation.) J. van Yperen. *Metalen,* v. 2, Dec. 1947, p. 79-81.
A method used in a Dutch factory.

14a-13. New Electro-Alloys Foundry in Production. *Industrial Heating,* v. 15, Jan. 1948, p. 54-56, 58, 60, 62, 64, 164.
Procedures and equipment in new foundry of Electro-Alloys Division of American Brake Shoe Co.

14a-14. The Scientist in the Foundry. C. R. Tottle. *Foundry Trade Journal,* v. 83, Dec. 25, 1947, p. 347-349.
Use of ultrasonic vibrations, radioactive isotopes, and a transparent silica window in a mold to facilitate investigation of conditions within. Use of a mirror dilatometer inserted in the mold wall, and a manometer for measuring internal pressure in castings. (Condensed from paper presented to the Institute of British Foundrymen.)

14a-15. Patternmaking and Foundry Practice. S. A. Horton. *Foundry Trade Journal,* v. 84, Jan. 1, 1948, p. 13-14.
Presidential Address to East Midlands Branch of Institute of British Foundrymen.

14a-16. Foundry Mechanization; Principles—Application to Nonferrous Alloys—the Human Problem. G. Skript. *Metal Industry,* v. 72, Jan. 16, 1948, p. 43-47. Also **Mechanization of Nonferrous Foundries,** *Foundry Trade Journal,* v. 84, Jan. 15, 1948, p. 51-57.
Based on paper presented before a joint meeting of the Institute of British Foundrymen and the Institute of Metals.

14a-17. A Foundry Goes Modern. *Business Week,* Jan. 31, 1948, p. 39-40, 42.
A picture story of new mechanized foundry of Fairbanks-Morse, Freeport, Ill.

14a-18. An American Observes European Foundry Methods. R. E. Fisher, Jr. *American Foundryman,* v. 13, Jan. 1948, p. 51-53.
Observations made in England, Scotland, France, Belgium, Czechoslovakia, and Switzerland.

14a-19. Metallurgy in the Foundry. James G. Dick. *American Foundryman,* v. 13, Jan. 1948, p. 60-61.
The practical value of the metallurgist's work in the production foundry.

14a-20. Unusual Shakeout Arrangement Speeds Sand Conditioning. *Iron Age,* v. 161, Feb. 5, 1948, p. 75.
Arrangement, in which sand from a mechanical shakeout unit is fed directly into a "Screenerator" which deposits it, conditioned, into a heap available for reuse.

14a-21. Determinable Variations in Close Tolerance Castings. L. M. Nielsen. *Foundry,* v. 76, Feb. 1948, p. 72-73.
Tolerances to be expected using different methods and materials for construction of patterns, molds, and cores. Use of metal driers.

14a-22. Foundry Parting Compounds. Hiram Brown. *Foundry,* v. 76, Feb. 1948, p. 74-75, 114, 117.
Various mixtures and materials used. Simple techniques for determining apparent specific gravity and waterproofing characteristics.

14a-23. Properties of Sand Cores. Victor Rowell. *Foundry,* v. 76, Feb. 1948, p. 80-81, 198, 200, 202, 204, 206.
Recommended compositions, and test procedures for evaluating the raw materials and the cores. (Based on paper presented at 10th annual Wisconsin Regional Foundry Conference).

14a-24. Cutting Foundry Costs With the Right Tool for the Job. D. S. Linton. *Foundry,* v. 76, Feb. 1948, p. 84-87, 248, 250, 252.
Previous articles in this series have discussed methods of cutting portable grinding-tool costs in the foundry by correcting defects in air conditions and by maintaining air equipment at the maximum point of efficiency. This article discusses opportunities for cutting costs by "application engineering", that is, by carefully selecting the right tool for the individual job.

14a-25. Plastic Matchplates Made by New Process. D. W. Talbott and J. L. Lessman. *Foundry,* v. 76, Feb. 1948, p. 194-196.
New method in which matched, integral-pattern units are inserted into wood or metal plates, thus eliminating use of screws or external fastening devices. Advantages.

14a-26. Pneumatic Straightener Reclaims Foundry Core Rods. *Compressed Air Magazine,* v. 53, Feb. 1948, p. 44.

14a-27. Situation et Evolution de la Technique des Isolants en Fonderie. (Situation and Evolution of the Technique of Binders for Foundry Use).

Pierre Nicolas. *Fonderie,* Oct. 1947, p. 843-852.

Composition and methods of preparation of various core binders, mold-lining materials, and parting compounds used in France. Compares them with British and American materials and makes suggestions for improvement of French materials.

14a-28. Malleable Foundry Finishing and Inspection. T. Earl Poulson. *American Foundrymen's Assoc., Preprint No.* 47-8, 1947, 8 pages.

14a-29. A Study of the Precision of Sand Test Data. Robert E. Morey and Carl G. Ackerlind. *American Foundrymen's Assoc., Preprint No.* 47-18, 1947, 7 pages.

Uses statistical methods to examine reproducibility or precision of tests used in the evaluation of foundry molding sands. Shewhart's method for relatively small samples was found particularly suitable for this purpose.

14a-30. New Tentative Standards for Grading and Fineness of Sands. R. E. Morey. *American Foundrymen's Assoc., Preprint No.* 47-29, 1947, 6 pages.

How fineness of foundry sands may be determined for particles too small to be screened by means of a hydrometer. The hydrometer test data combined with information obtained by sieving the coarser material gives complete information on particle-size distribution. When plotted on semi-log paper, these data form a smooth curve which permits exact comparisons among mold materials. A cumulative curve also may be drawn from data obtained using screens only. In either case, size distribution can be determined by inspection, and an index to grain distribution can be found by means of a simple calculation.

14a-31. Feeding of Metal Castings. A. F. Faber, Jr., and D. T. Doll. *American Foundrymen's Assoc., Preprint No.* 47-35, 1947, 14 pages.

Derivation of a general equation for gating castings and experimental evidence in support of same.

14a-32. Density of Molding Sand. H. W. Dietert, H. H. Fairfield, and E. J. Hasty. *American Foundrymen's Assoc., Preprint No.* 47-39, 1947, 15 pages.

Discusses density of molding sand and its chilling effect upon liquid metal. Variations of density caused by different ramming techniques and by use of different additives. Relationships of density to mold hardness and to grain size and distribution, and clay and moisture content.

14a-33. Evaluation of Core Knockout. *American Foundrymen's Assoc., Preprint No.* 47-43, 1947, 13 pages.

Results of a series of foundry and laboratory tests to study the relationship between behavior of cores during shakeout and laboratory tests at elevated temperatures.

14a-34. Heat Transfer. *American Foundrymen's Assoc., Preprint No.* 47-55, 1947, 23 pages.

Contains a report of the committee chairman and several other papers which are being abstracted separately.

14a-35. Influence of Properties on Solidification of Metals. Victor Paschkis. *American Foundrymen's Assoc., Preprint No.* 47-55, 1947, p. 2-9.

Results of tests to determine the relative importance of all thermal properties. Uses the electric analogy method.

14a-36. Thermal Conductivities of Three Sands. C. F. Lucks, O. L. Linebrink, and K. L. Johnson. *American Foundrymen's Assoc., Preprint No.* 47-55, 1947, p. 10-13.

Method and apparatus used in determining the above over a temperature range of 750 to 2250° F.

14a-37. Molding Boxes. John B. Morton. *Foundry Trade Journal,* v. 84, Jan. 29, 1948, p. 97-102.

Fabrication of large cast-iron boxes from standardized sections.

14a-38. Synthetic Resin Binders; Application in the Foundry Industry. Howard C. Frisbie. *American Foundryman,* v. 13, Feb. 1948, p. 37-39.

Types, applications, advantages, and procedures for use.

14a-39. Malleable Sand Control. David Tamor. *American Foundryman,* v. 13, Feb. 1948, p. 50-51.

A general discussion.

14a-40. Modern Foundry Theory for the Patternmaker. E. J. McAfee and R. G. Wagner. *American Foundryman,* v. 13, Feb. 1948, p. 52-56.

Excerpts from "The Patternmaker's Manual", Training Office, Puget Sound Naval Shipyard.

14a-41. Industrial Vacuum Melting. Kenneth Fox, R. A. Stauffer, and W. O. DiPietro. *Iron Age,* v. 161, Feb. 19, 1948, p. 64-70.

Various design features and the influence of these factors on production, maintenance, and measurement of vacuums ranging from 1 to 25 microns. (To be continued.)

14a-42. Multiple Molding Can Increase Production. William G. Gude. *Foundry,* v. 76, March 1948, p. 66-69, 198, 200.

The multiple-molding method developed at Wisconsin Appleton Co. and its advantages and limitations.

14a-43. Investment Casting. Edwin Laird Cady. *Scientific American,* v. 178, March 1948, p. 119-121.
Method and its applications.

14a-44. Recurrent Wasters. Shedrick. *Iron and Steel,* v. 21, Feb. 1948, p. 38.
Some reasons for difficulty in ensuring correct practice in repeat orders for a given casting job.

14a-45. New Moldmaking Practice—for Foundries. *Plastics* (London), v. 12, Feb. 1948, p. 74-75. Based on F.I.A.T. Final Report 1168.
New process developed by Croning and Co., Hamburg, Germany. A plastic bonding agent is used to bind the sand grains together for unusual surface smoothness, high gas permeability, and dimensional stability. The process is especially suitable for the production of steel castings with very thin sections.

14a-46. Design and Production Technique. VI—Principles Involved in Casting. A. J. Schroeder. *Aircraft Engineering,* v. 20, Feb. 1948, p. 57-60.
Principles are illustrated by an extensive series of diagrams.

14a-47. The Metallurgist in the Foundry. W. H. Salmon. *Foundry Trade Journal.* v. 84, Feb. 5, 1948, p. 121-128, 132.
Cooperation between technician and practical man.

14a-48. Notes on Pattern Construction. R. J. Hart. *Foundry Trade Journal,* v. 84, Feb. 12, 1948, p. 145-147.
How use of block cores permits greater precision in molding. (Presented at symposium organized by East Anglian Section of London Branch of Institute of British Foundrymen.)

14a-49. The "C" Process. E. Piwowarsky. *Foundry Trade Journal,* v. 84, Feb. 19, 1948, p. 181.
New casting process developed in Germany and described in Dec. 4, 1947 issue. (See item 14a-9.) Its pros and cons. At present it is considered primarily as suitable for the production of special shapes of not too great a cross-section. It gives solid and accurately finished castings which in most cases do not require any further surface machining. Phenolic resin boiled molds and cores are used.

14a-50. Permanent Molds. J. B. McIntyre. *Metal Industry,* v. 72, Feb. 20, 1948, p. 143-145.
Materials now in use for permanent-mold manufacture, together with their attendant disadvantages; optimum requirements for refractory molds; reviews the literature.

14a-51. Automatic Mechanical Ladling. E. F. Ross. *Steel,* v. 122, March 15, 1948, p. 108, 111.
Use in die casting eliminates manual ladle-to-injection-chamber transfers. Castings are produced at rate of 1 to 2 per min.

14a-52. Precision Casting. *Engineering Materials and Processes,* v. 5, Dec. 1947, p. 159-161.

14a-53. Modern Foundry Equipment. James F. Driver. *Machinery Lloyd* (Overseas Edition), v. 20, Feb. 28, 1948, p. 79-87.
Sand-testing equipment, analytical reagents, conveyers, shot-blast equipment for cleaning castings, as well as melting furnaces, molding machines, and centrifugal-casting equipment.

14a-54. Produces Wide Variety of Iron and Nonferrous Castings. Gerald E. Stedman. *Foundry,* v. 76, April 1948, p. 92-94.
Products of Paxton-Mitchell Co., Omaha, Neb., include both Fe and Cu-base alloy castings for various uses; and operating practice incorporates both static and centrifugal-casting methods.

14a-55. Foundry Sand Uncontrolled. *Foundry,* v. 76, April 1948, p. 95, 230, 232, 234, 236.
A practical, nonscientific description of foundry-sand troubles and what was done about them at H. C. Macaulay Foundry Co., Berkeley, Calif., a job-shop.

14a-56. Valve Manufacturer Expands Foundry. Joseph C. Sullivan. *Foundry,* v. 76, April 1948, p. 208-210, 212.
New equipment to meet augmented demand for gray iron, brass, bronze, and alloy castings.

14a-57. Molding and Core Sand Control Through Binder Selection. (Concluded.) Earl E. Woodliff. *Pig Iron Rough Notes,* Winter 1948, p. 11-14.
Properties and applicabilities of various binders.

14a-58. Problems in a Quantity Production Foundry. J. Hird. *Foundry Trade Journal,* v. 84, March 11, 1948, p. 243-249; discussion, p. 249-250.
Mechanization, core-sand preparation, mold preparation, casting inspection, and the control laboratory. (Presented at meeting of Wales and Monmouth Branch, Institute of British Foundrymen.)

14a-59. The Use of Fullers' Earth in Foundries. L. V. Roy. *Foundry Trade*

Journal, v. 84, March 18, 1948, p. 271-274.

Functions in sand preparation.

14a-60. Adaptable Runner Feeds for Multiple Cavity Dies. W. M. Halliday. *Machinery* (London), v. 72, March 25, 1948, p. 410.

In pressure die casting with a number of cavities, when the amount of metal required exceeds the delivery capacity of the machine, flow to certain cavities must be blocked. Disadvantages of use of detachable sealing pads and an arrangement which overcomes them.

14a-61. La Mecanisation et la Modernisation des Fonderies. (Mechanization and Modernization of Foundries.) Rene Norquet. *Fonderie,* Dec. 1947, p. 913-922.

Results of a comparative study of foundry practices in France, Great Britain, and the U. S. before and after World War II. Lack of mechanization and modernization in the French industry. Remedies for this situation.

14a-62. Les Moyens Mécaniques de Manutention dans les Fonderies. (Mechanical Means of Control in Foundries.) Rene Kenner. *Fonderie,* Dec. 1947, p. 923-924.

Long-run economy in spite of high initial costs.

14a-63. La Sablerie Dans la Mécanisation des Fonderies. (The Mold-Production Department in the Mechanization of Foundries.) Henri Perchat. *Fonderie,* Dec. 1947, p. 925-927.

Need for standardization and reduction in the number of mold designs in order to achieve efficient mechanization.

14a-64. Le Decochage. (Stripping). Pierre Rigaut. *Fonderie,* Dec. 1947, p. 928-930.

Methods of stripping in foundry practice. Use of mechanical stripping.

14a-65. Récents Progres dans la Technique de Décapage. (Recent Progress in the Technique of Scouring.) G. Cros. *Fonderie,* Dec. 1947, p. 930-932.

Modern mechanical means for cleaning castings.

14a-66. Représentation d'Une Distribution Granulométrique. (Graphic Representation of Grain.) Paul Dauxois. *Fonderie,* Dec. 1947, p. 939-941.

Use of cumulative curves which permit determination of certain coefficients for foundry sand.

14a-67. Dispositifs Spéciaux du Trousseau a Excentrique Permettant le Moulage de Pieces Circulaires Composées de Plusieurs Fragments Usinés a Leur Assemblage. (Special Eccentric Device for Casting of Circular Pieces Composed of Several Sections Machined During Their Final Assembly.) Joseph Pascal. *Fonderie,* Dec. 1947, p. 944-946.

Device is in commercial operation.

14a-68. From a Sandman's Notebook. Harold E. Henderson. *Western Machinery and Steel World,* v. 39, April 1948, p. 98-99.

Foundry sand problems.

14a-69. Chemically Bonded Sand; Its Present Status; Its Future. T. Barlow. *Iron Age,* v. 161, April 22, 1948, p. 80-83.

Originally introduced into commercial use slightly more than a year ago, above sand is now being used in 12 large mechanized foundries producing some 2000 tons of castings daily. Experiences to date and plans for extending its use to steel, bronze, and brass molding and corerooms, as well as smaller shops.

14a-70. Expansion of Silica Sand. Herbert H. Fairfield. *Foundry,* v. 76, May 1948, p. 128-129.

It is pointed out that the greatest stress in the mold face exists in the silica-sand layer at 1100° F., at which point expansion coefficient is greatest. Methods for overcoming casting defects caused by cracking or spalling of the mold face by addition of other materials to the sand, by proper selection of sands and clays, and by softer ramming.

14a-71. Statistical Quality Control; A New Tool for the Foundryman. H. H. Johnson and G. A. Fisher. *American Foundrymen's Association, Preprint No.* 48-7, 1948, 13 pages.

Principles underlying the methods and examples of their application in evaluating process control in a steel foundry.

14a-72. Heat Transfer; A.F.A. Committee Report. H. A. Schwartz. *American Foundrymen's Association, Preprint No.* 48-17, 1948, 16 pages.

Chairman's introduction, two papers on thermal conductivity of sand mixtures, and one each on solidification of Al, white-iron castings and steel spheres, respectively. Each of the papers is being abstracted separately.

14a-73. Thermal Conductivity of a Sand Mixture. C. F. Lucks, O. L. Linebrink and K. L. Johnson. *American Foundrymen's Association, Preprint No.* 48-17, p. 1-3.

Results of a determination for a mixture consisting of 60% 20-30 sand (Ottawa Silica Co.) and 40% No. 7 sand (American Graded Sand Co.) over a range of 750 to 2250° F.

14a-74. Thermal Conductivity of Dry Sands. J. C. Bell. *American Foundrymen's Association, Preprint No.* 48-17, 1948, p. 3-4.

An appendix to the previous paper. (see above abstract.) A theoretical treatment of the problem. The theoretical and experimental values show reasonably good agreement.

14a-75. Changes in Chemistry of Liquid Steel in Contact With Sand. J. B. Caine. *American Foundrymen's Association, Preprint No.* 48-29, 1948, 3 pages.

Results of a study. This year's report is concerned with changes in chemical composition of steel when it comes in contact with the sand.

14a-76. A Theoretical Approach to the Problem of Dimensioning Risers. J. B. Caine. *American Foundrymen's Association, Preprint No.* 48-36, 1948, 8 pages; discussion, p. 7-8.

The approach is based on heat evolved, heat dissipated, and volume contraction on solidification. The author believes that its use will result in an appreciable increase in casting yields.

14a-77. A Suggested Method for the Determination of Coke Reactivity to Carbon Dioxide at Combustion Temperatures. H. Edward Flanders. *American Foundrymen's Association, Preprint No.* 48-37, 1948, 6 pages.

In an effort to determine the fundamental differences between good and bad cokes, a method for determining the rate of reaction of coke with CO_2 at temperatures existing in cupola combustion is proposed. It is based on analysis of combustion gases during adiabatic combustion of a column of coke. From the relation of composition to height of the coke column, rate of the reaction can be approximately calculated and the coke reactivity with CO estimated as a function of temperature.

14a-78. Surface Gas Pressure of Molding Sands and Cores. H. W. Dietert, H. H. Fairfield, and F. S. Brewster. *American Foundrymen's Association, Preprint No.* 48-39, 1948, 8 pages.

Gas pressure within a core or molding-sand specimen was determined by ramming a brass tube into the core. A sensitive diaphragm-type pressure gage was used. The specimens were immersed in a molten-lead bath held at 1200° F. Gas pressure was found to increase as moisture, seacoal, oil, or cereal content was increased. Extremely high mold hardness also increased gas pressure. The effect of baking time on core-gas pressure was also determined.

14a-79. Modernization of the "Small" Foundry. Lester B. Knight. *American Foundrymen's Association, Preprint No.* 48-53, 1948, 16 pages.

Importance of such factors as sales methods and prices, organization and personnel, cost control, patterns, rigging, production equipment and methods, wage incentives, plant layout, materials handling, good housekeeping, and mechanized facilities.

14a-80. Vnitrni Nalitky. (Internal Risers.) A. Bichler. *Hutnické Listy* (Metallurgical Topics), v. 3, Feb. 1948, p. 41-43.

Results of experiments in Czechoslovakia are not in agreement with those of Canadian foundries. The layer of sand between the envelopes of the internal riser formed by the casting and the internal riser does not transmit any appreciable amount of heat due to its low conductivity. Removal of internal risers presents great difficulties which cannot be overcome even by the use of Washburn plate.

14a-81. Gating System Designs Affect Pouring Rates. J. G. Mezoff and H. E. Elliott. *American Foundryman,* v. 13, April 1948, p. 107-112.

While Mg alloys were used in conducting the tests described, many of the principles established apply also to the casting of any metal. The effects on pouring rate of the following design factors were established: sprue cross-sectional area, sprue cross-sectional shape, sprue length, sprue taper, sprue-mouth design, and pouring-basin depth. Also studied was effect of pouring temperature. (Presented at 52nd annual meeting, A.F.A., Philadelphia, May 3-7, 1948.) (Also published as Preprint No. 48-33.)

14a-82. Does Metal Vapor Cause Sand Penetration? Silas G. Jones. *American Foundryman,* v. 13, April 1948, p. 139.

Evidence is cited for the belief that metal penetration of sand results from metal vapor or metal-laden gas passing through the sand.

14a-83. Controlling Sand Grain Distribution Reduces Steel Foundry Costs. C. A. Sanders. *American Foundryman,* v. 13, April 1948, p. 142-146.

Recommends use of actual grain distribution data rather than A.F.A. fineness numbers for comparison and selection of sands. Control of the grain-distribution curve results in considerable savings in amounts of silica flour, bonding material, wood flour, and other additives to molding sand. 24 ref. (Presented at Ohio Regional Foundry Conference, Cleveland, March 11-12, 1948.)

14a-84. Preparing Foundry Sand With Manganese Resinate. F. Fere. *American Foundryman,* v. 13, April 1948, p. 147-149.

Procedure was developed in France. It was common practice to use linseed oil as a binder, together with a cohesion-improving agent such as molasses. However, the cores had a tendency toward deformation under their own weight. This difficulty was remedied by baking with "resinates", prepared by reaction of PbO_2 or MnO_2 with natural resins. These, in turn, copolymerize with the linseed oil on baking, and form good cores.

14a-85. Foundry Practice. H. W. Lownie, Jr. *Metals Review,* v. 21, April 1948, p. 3, 5, 7, 9.

Survey of literature for the past year begins with discussion of economic trends.

14a-86. Foundry Equipment. *Metals Review,* v. 21, April 1948, p. 11, 13, 15, 17, 19, 21, 23.

Products, materials, and services for the foundryman, introduced during the past year.

14a-87. Commercial Possibilities of the Lost Wax Process. A. Short. *Aircraft Engineering,* v. 20, April 1948, p. 105-108.

Process as it is used at present time on production. Further developments of the process, and production costs of some castings together with production limitations and possibilities.

14a-88. The Danish Foundry Industry. Ove Hoff. *Foundry Trade Journal,* v. 84, April 1, 1948, p. 323-324, 328.

Some novel developments. (To be continued.)

14a-89. The Flowability of Molding Sand With Special Reference to the Shatter Test. *Foundry Trade Journal,* v. 84, April 15, 1948, p. 365-367.

A guide to sand control methods based on test results. A condensation from paper presented at the February meeting of the Birmingham, Coventry, and West Midland Branch of the Institute of British Foundrymen.

14a-90. Venting of Cores and Molds. D. Killingworth. *Foundry Trade Journal,* v. 84, April 22, 1948, p. 389-394.

Results of a study and methods for evacuation of gases to prevent blowholes.

14a-91. Precision in Castings. *Business Week,* May 15, 1948, p. 64, 69.

Trends in foundry practice.

14a-92. A Critical Survey of Investment Casting. Rawson L. Wood and David-lee Von Ludwig. *Iron Age,* v. 161, May 6, 1948, p. 72-78; May 13, 1948, p. 90-94, 140, 142.

Information and data necessary to intelligently appraise the potentialities of investment casting as a means of reducing costs or improving performance. The various metals and alloys used for the process and their advantages and disadvantages. Design consideration. 11 ref.

14a-93. Método de Estudo na Operacao de Estufamento dos Machos. (Method of Investigation of the Process of Core Drying.) Herbert H. Fairfield and Carlos Dias Brosch. *Boletim da Associacao Brasileira de Metais,* v. 4, Jan. 1948 p. 67-73.

Use of a time-temperature diagram for graphic analysis of the process. Such a diagram is believed to be of value for industrial control.

14a-94. Po de Carvao Vegetal como Adicao na Areia de Moldagem. (Charcoal as an Addition to Molding Sand.) Tomio Kitice. *Boletim da Associacao Brasileira de Metais,* v. 4, Jan. 1948, p. 94-98.

Results of an investigation for the purpose of cost reduction. Photomicrographs showing structure of the cores thus made.

14a-95. A New Range of Molding Machines. J. H. Hufton. *Foundry Trade Journal,* v. 84, April 29, 1948, p. 419-420, 425.

British-made hydraulically-operated machines for large boxes.

14a-96. Feeding Castings; A New Approach. S. T. Jazwinski. *American Foundryman,* v. 13, May 1948, p. 75-80.

A pressure greater than atmospheric is introduced into the feeder head by means of a special compound suspended therein in a small container. When the heat penetrates this container, gas is evolved which forces the molten metal into the casting. The desired action depends primarily on directional control of freezing by means of pressure gradient. (Presented at 16th Annual Foundry Practice Conference Birmingham District Chapter, A.F.A., Birmingham, Ala., Feb. 12-14, 1948.)

14a-97. Designing Strainer Cores. H. L. Campbell. *American Foundryman,* v. 13, May 1948, p. 107-108.

Proposes seven standard shapes and sizes for the above foundry industry. They are employed to control discharge of metal from pouring basins or to regulate flow of metal in gating systems. (Presented at 52nd annual meeting, A.F.A., Philadelphia, May 3-7, 1948.)

14a-98. Variable Properties Found in Western Bentonites. E. C. Troy. *American Foundryman,* v. 13, May 1948, p. 111-112.

Results of experimental work over a period of years conducted in order to aid in making allowance for variable properties when compounding sand mixtures.

14a-99. Foundry Shakeouts; Advantages From a Production Angle. *Iron and Steel,* v. 21, May 1948, p. 165-166.

Machines for knocking sand out of the molding boxes.

14a-100. Röntgendiaskopische Bewertung von Zinn- und Zinn-Austauschuberzugen auf Kernstutzen. (X-Ray Evaluation of Tin and Tin-Replacement Coatings on Core Supports.) H. Reininger. *Archiv fur Metallkunde,* v. 1, Oct. 1946, p. 39-48.

Requirements for foundry practice. Test results for a variety of conditions and replacement metals. 39 ref.

14a-101. Eine kolloidchemische Theorie uber anorganische Bindemittel der Formsande. (A Colloid-Chemical Theory of Inorganic Molding-Sand Binders.) H. Reininger. *Archiv fur Metallkunde,* v. 1, Jan. 1948, 63-73.

A theory was developed which accounts satisfactorily for the behavior of both foundry sand and binder materials. The theory is believed to be of practical value for the development of synthetic inorganic binders. 31 ref.

14a-102. Verfahren und Einrichtungen zur technologischen Untersuchung der Form-und Kernsande. (Methods and Apparatus for Research on Molding and Core Sands.) L. Jenicek. *Archiv fur Metallkunde,* v. 1, Jan. 1948, p. 83-94.

Special methods and equipment permeability, bending strength, and for determination of moisture, gas wear resistance.

14a-103. Molten Metal for Gravity Dies. *Light Metals,* v. 11, May 1948, p. 231-233.

Current methods of production in gravity die foundries, with reference to improvements offered by the recently introduced "Reverbale" furnace, which incorporates in one unit a reverbatory melting chamber and three bale-out stations.

14a-104. Vorman en Gieten in Cementzand. (Molding and Casting in Cement Sand.) H. Achatz. *Metalen,* v. 2, April 1948, p. 165-171.

Producing castings up to 40 tons in weight. Preparation, properties, and applications of cement sand.

14a-105. Westinghouse is Operating an Automatic Molding Unit. John A. Sharritts. *Foundry,* v. 26, June 1948, p. 78-85, 216, 218, 220, 222, 224.

14a-106. Factors Influencing Core Baking. E. C. Troy. *Foundry,* v. 26, June 1948, p. 92-95, 252, 254, 256.

14a-107. New Alloy Foundry Typifies Modern Design, Pat Dwyer. *Foundry,* v. 26, June 1948, p. 104-109, 270, 272, 274.

Layout, equipment, and procedures.

14a-108. Screwball Ideas Sometimes Work in the Foundry. J. W. Horner, Jr. *Foundry,* v. 26, June 1948, p. 91, 238, 240.

14a-109. Precision Casting at Allis-Chalmers. *Iron Age,* v. 161, June 3, 1948, p. 82-85.

Some notes on equipment and techniques for producing castings by the lost-wax process.

14a-110. Simplified Methods and Improved Equipment Advances Precision Investment Casting. K. J. Yonker. *Steel,* v. 122, June 7, 1948, p. 96-99.

Improvements since 1943, include use of machined-steel dies instead of Sn-Bi alloy cast around a brass or steel pattern; two improved types of injection machines; and use of 35-lb.-capacity, 9600 cycle, induction furnaces.

14a-111. La Fusione di Precisione. (Precision Casting.) E. D'Amico. *La Metallurgia Italiana,* v. 39, Nov.-Dec. 1947, p. 247-260.

Modern methods and applications.

14a-112. Dry-Sand Patterns. James Timbrell. *Foundry Trade Journal,* v. 84, May 13, 1948, p. 457-461.

A method which will ease problems in patternmaking for smaller jobbing foundries.

14a-113. Patterns From Casting Resins. Robert W. Shaeffer. *Tool Engineer,* v. 20, June 1948, p. 31-32.

Technique and procedures for making foundry patterns from synthetic resins.

14a-114. Casting Metals in Ceramic Molds. W. P. Gillingham. *Compressed Air Magazine,* v. 53, June 1948, p. 135-138.

"Lost-wax" process.

14a-115. Plastic Pattern Equipment. Steve Denkinger. *American Foundryman,* v. 13, June 1948, p. 43-45.

14a-116. Foundry Methods Improve Investment Casting. Kenneth R. Geist. *American Machinist,* v. 92, June 3, 1948, p. 83-86.

Improvements in manufacture of buckets for aircraft turbo-super-

charger rotors by "lost wax" process.

14a-117. Practical Aspects of Machine Moulding. J. H. Peers. *Foundry Trade Journal,* v. 84, May 27, 1948, p. 507-510.
Equipment, applications, and operational details.

14a-118. The Norwegian Foundry Industry. John Sissner. *Foundry Trade Journal,* v. 84, May 27, 1948, p. 515-516.

14a-119. Solving the Foundry Shakeout Problem. J. W. Fair. *Machinery Lloyd.* (Overseas Edition), v. 20, June 19, 1948, p. 109-111.
Use of a mechanical shakeout machine.

14a-120. Precision Investment Casting. George A. Stetson. *Mechanical Engineering,* v. 70, July 1948, p. 579-580.

14a-121. High Output Achieved by Improved Investment Casting Process. K. J. Yonker. *Machine and Tool Blue Book,* v. 44, July 1948, p. 121-126, 128.
Special machines inject wax into pattern molds and the use of special 35-lb. capacity induction-melting furnaces.

14a-122. The "Lennox" Sand-Drier. *Foundry Trade Journal,* v. 84, June 10, 1948, p. 563-565.
Equipment for which the following advantages are claimed: absence of large rotating parts; small floor area; simplicity, easily handled by unskilled labor; delivery of cooled, dry sand up to 100 ft. from wet sand intake; high thermal efficiency; low maintenance costs; continuous operation; adaptable for use with most heating media.

14a-123. Patternmaking—A New Machine for Cutting Irregular Shapes. B. Levy. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B70-B75; discussion, p. B75-B76.
A mechanically operated machine for producing patterns, easily and economically, from wood and very soft metals.

14a-124. Centrifugal Casting. L. Northcott. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B77-B81; discussion, p. B81-B82.
A general discussion of various types, except precision casting.

14a-125. Influence of Design and Pattern-Making on Foundry Technique. T. H. Sneddon. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B83-B92.
Construction of first-class patterns for use in repetition or semi-repetition foundry. Throat ring, wheel, liquid channel, flexible coupling, ring, valve, bearing-block "V" cutter, roller, and manganese steel type castings.

14a-126. Application of Hydro-Blast to Dressing and Sand Recovery. Wm. Y. Buchanan. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B110-B119; discussion, p. B119.
A historical review and description of technique.

14a-127. Precision Casting for Mass Production. *Modern Industry,* v. 16, July 15, 1948, p. 123.
Photographs show some operations at Allis-Chalmers

14a-128. Zur Entwicklung von Giessverfahren mit Schwingungsbehandlung (Ultraschallgiessverfahren). (Development of a Casting Process Utilizing Vibrations—Ultrasonic Casting Process). H. J. Seemann and H. Menzel. *Metall,* Oct. 1947, p. 39-46.
Laboratory-scale research over a range of frequencies from mechanically or electromagnetically induced low-frequency vibrations to ultrasonic waves. The different types of apparatus. Specifications for large-scale experiments.

14a-129. Verbesserung der Anschnitt-Technik als Beitrag zur sparsamen Wirtschaft in Giessereien. (Improvement in Gating Practice for More Economical Foundry Operation) H. Reininger. *Metall,* Oct. 1947, p. 46-54.
Gating practice is analyzed from the hydrodynamic point of view. Equations for rate of flow, reduction in pressure; and other factors affecting the flow of metal in molds.

14a-130. Permanent Mold Castings-Ferrous and Nonferrous. Herbert Chase. *Materials & Methods,* v. 28, July 1948, p. 75-86.
Materials & Methods manual includes production methods and equipment; material selection; dimensional tolerance; production conditions affecting design; and design rules.

14a-131. Mass Production of Precision Castings. *American Foundryman,* v. 14, July 1948, p. 46-49.
The methods and equipment used.

14a-132. Foundry Sand Reclamation. J. M. Cummings and W. M. Armstrong. *Canadian Metals & Metallurgical Industries,* v. 11, July 1948, p. 24-26, 39-40.
Development of a low cost system for small foundries on the basis of a study of the present methods and on experimental investigation of a wet-scrubbing process.

14a-133. How to Prepare Metals for Precision Casting. A. K. Higgins. *Steel,* v. 123, Aug. 2, 1948, p. 88-90.

Answers to some of the more pressing problems encountered in establishing efficient melting practice.

14a-134. Facing Sand Without Coal Dust. R. G. Bate. *Foundry Trade Journal,* v. 85, July 1, 1948, p. 6.

Experiences with a foundry sand compounded without coal dust.

14a-135. Mechanization for the Small Foundry. A. W. Gregg. *Foundry,* v. 76, Aug. 1948, p. 68-73, 142, 145.

Materials-handling equipment and advantages to be derived from mechanization.

14a-136. Precision Investment Casting at Allis-Chalmers. *Foundry,* v. 76, Aug. 1948, p. 78-81, 248, 250, 252.

14a-137. Matchplates Made From Plastic. *Foundry,* v. 76, Aug. 1948, p. 122, 124.

Method used for making them.

14a-138. Designing and Rigging for Core Blowing. H. J. Jacobson. *American Foundryman,* v. 14, Aug. 1948, p. 41-45.

Various aspects of subject and suggestions regarding best design, and material and technique to be used for a core box of average size and shape.

14a-139. Centrifugal Casting; Calculations and Feeding Pressures. W. A. Spindler. *American Foundryman,* v. 14, Aug. 1948, p. 57-58.

Simple equations for various phases of centrifugal casting. In addition to clarifying the mathematics of the process, the three active feeding pressures are examined relatively. Centrifugal casting speeds.

14a-140. Centrifugal Process Improves Investment Castings. Vincent S. Lazzara. *American Machinist,* v. 92, Aug. 26, 1948, p. 93-96.

Process in which plastic patterns replace wax. No shrinkage allowances are required and many alloys are cast to finished size.

14a-141. Die Lunkerbildung und die quantitätive Berechnung ihrer Gröbe. (Cavities or "Pipes" in Castings and the Quantitative Calculation of Their Size.) F. Sauerwald. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 403-408.

Factors responsible for formation of cavities during solidification of castings and methods for calculating the size of cavity formed under specific conditions.

14a-142. Hydraulické reseni vtoku licich forem. (Determination of the Dimensions of Pouring Gates by a Hydraulic-Analogy Method.) Jan Kieswetter. *Hutnicke Listy,* v. 3, June 1948, p. 165-170.

A theoretical analysis of the problem.

14a-143. Precision Investment Casting. *Canadian Metals & Metallurgical Industries,* v. 11, Aug. 1948, p. 14-16, 34.

Methods employed at Bayonne Works, International Nickel Co.

14a-144. Core Baking; An Interesting American Development in Foundry Practice. *Automobile Engineer,* v. 38, Aug. 1948, p. 314.

Induction-heating, tunnel-type, continuous unit.

14a-145. Precision Castings. *Mining and Metallurgy,* v. 29, Aug. 1948, p. 450-451.

The applications, limitations, and steps in the lost-wax method.

14a-146. Some Fundamental Problems in Foundry Planning. Jorgen Drachmann. *Foundry Trade Journal,* v. 85, Aug. 5, 1948, p. 121-127.

Problems and application of principle of total load and principle of margin to a foundry system.

14a-147. Using an Old Technique to Make Parts Too Difficult to Produce by Other Means. Joseph Geschelin. *Automotive Industries,* v. 99, Aug. 15, 1948, p. 28-30, 70, 72, 76.

How Allison-Bedford Foundry of General Motors specializes in casting aluminum parts by Antioch plaster mold process for Buick torque converters, Detroit diesel engines and other equipment.

14a-148. Repetition Pattern Making. K. L. Futter. *Foundry Trade Journal,* v. 85, Aug. 19, 1948, p. 176-179.

A survey of methods.

14a-149. Die Lubrication; Contributing Factor to Profitable Die Casting. H. Pocock and J. L. Erickson. *Metal Industry,* v. 73, Aug. 20, 1948, p. 143-145; Aug. 27, 1948, p. 166-168.

Why a die lubricant is needed; what properties it must possess; what lubricants possess the required properties; and how they should be applied. Concluding installment deals with coolants; insulating media; reducing cold shuts; plunger lubricants; types of lubricant; and silicones and their application.

14a-150. Precision Investment Casting At International Nickel Co. Robert H. Herrmann. *Foundry,* v. 76, Sept. 1948, p. 94-98, 188, 190, 193, 196-198.

14a-151. Metal Cope and Drag Patterns. Roy A. Loder. *Foundry,* v. 76, Sept. 1948, p. 146, 148.

Method of making these patterns.

14a-152. Mechanized Foundry Operations. *Steel,* v. 123, Aug. 30, 1948, p. 81, 84.

Transformation of molten metal to finished castings in 1¼ hr.

14a-153. Sable de Moulage Etuvé. (Molding Sand.) Pierre Nicolas. *Fonderie,* May 1948, p. 1172-1176.

Results of a comparative investigation of use of green and dry sand. Effects of various sand factors on quality of the castings.

14a-154. Foundry Sands Evaluated; Naturally Bonded Vs. Synthetic Sands. C. A. Sanders. *American Foundryman,* v. 14, Sept. 1948, p. 45-49.

Advantages and disadvantages of the various types. 29 ref.

14a-155. Unit Casting Cost Greatly Reduced by Automatic Molding. John A. Sharritts. *Steel,* v. 123, Sept. 20, 1948, p. 126, 128, 132.

Previously abstracted from *Foundry,* v. 26, June 1948, p. 78-85, 216, 218, 220, 222, 224.

14a-156. Obturateur mécanique d'appareil de fusion. (Mechanical Plug for Casting Apparatus.) Jean Guillamon. *Fonderie,* June 1948, p. 1202-1203.

Mechanically operated device for the ladle or furnace from which the molten metal is allowed to pour on removal of the plug.

14a-157. Moulding in Sand With Additions of Cement. G. Kniaginin. *Engineers' Digest* (American Edition), v. 5, Aug. 1948, p. 314. Translated and abstracted from *Hutnik* (Poland), v. 15, Jan. 1948, p. 16-21.

Several methods for use in foundry practice.

14a-158. Plastic Matchplates; Development of Castable Synthetic Resin. *Metal Industry,* v. 73, Sept. 3, 1948, p. 193. Condensed from recent issue of *Foundry.*

14a-159. Comparative Strength and Hardness of Core Binders. Hiram Brown. *Foundry,* v. 76, Oct. 1948, p. 76-79, 242, 244-246.

Results of study of 17 different binders consisting of four general types (linseed base, petroleum base, urea resin, and corn starch). Simple tests which can be duplicated with minimum cost and skill.

14a-160. Friction Cutting Gates and Risers by the Band Saw Method. H. J. Chamberland. *Foundry,* v. 76, Oct. 1948, p. 94-97, 208, 210.

Method for trimming ferrous and nonferrous castings. Economic advantages within certain limits of material thicknesses. Time required for trimming typical stainless-steel parts and recommended procedures and test results for four examples in aluminum and two in magnesium.

14a-161. How to Reinforce a Fragile Pattern. John R. Nichols. *Foundry,* v. 76, Oct. 1948, p. 118.

Methods used.

14a-162. Precision Molding Process Employs Resin Binder. William W. McCullough. *Foundry,* v. 76, Oct. 1948, p. 130-132. Based on F.I.A.T. Final Report No. 1168, PB 81284, Office of Technical Services, Dept. of Commerce, Washington.

Process developed by Croning & Co., Hamburg, Germany, as obtained by interrogation of the inventor. It is believed that the method may be an important advancement in the art of metal founding. Advantages claimed are: clean edges, true dimensions, unchilled surfaces, complete dimensional stability, equivalence to permanent molds in smoothness, feasibility of casting steel sections as thin as 1/10 in., decrease in floor-space and labor requirements, and use of simple and inexpensive equipment.

14a-163. Sulla formatura in sabbia-cemento. (Casting in Sand-Cement Molds.) Ugo Keller. *La Metallurgia Italiana,* v. 39, May-June 1947, p. 107-114.

Process is known as the "Randupson" process. Details and typical applications. Advantages in comparison with other commonly used processes. 15 ref.

14a-164. Report on a Process for the Reclamation of Foundry Sand. G. M. Cummings and W. M. Armstrong. *British Columbia Research Council, University of British Columbia, Technical Bulletin* No. 3, 16 pages.

The dry, thermal, and wet reclamation methods. Flow sheet for typical runs on a pilot mill. A proposed reclamation system.

14a-165. An Analysis of Entries in the 1948 A.F.S. Apprentice Contest. Roy W. Schroeder. *American Foundryman,* v. 14, Oct. 1948, p. 24-27.

Some of the prize-winning and not-so-good castings submitted pointing out their good and bad features. A wide divergence of thought on gating, risering, and pattern construction.

14a-166. Maintenance of Sand Laboratory Equipment. *American Foundryman,* v. 14, Oct. 1948, p. 54.

Visits to 13 cooperating laboratories resulted in the recommendations given.

14a-167. Gases Given Off by Core Binders. Hiram Brown. *Foundry,* v. 76, Nov. 1948, p. 84-87, 244-245.

In second and concluding article, the gases given off by various binders during baking, and practical tests to determine the most suitable binder.

14a-168. Polystyrene in Centrifugal Casting. *Modern Plastics,* v. 26, Nov. 1948, p. 112-115.

Advantages of use of plastic material over wax in producing metal castings by the lost-wax process.

14a-169. Diesel Bearings Cast in Sheet-Steel Flasks. C. O. Donley. *American Machinist,* v. 92, Nov. 4, 1948, p. 89-91.

How split bearings are formed by pouring bronze liners into flask rings around the steel shells. Accurate machining and close inspection insure good results.

14a-170. Die Casting Die Design. Part II. Cores. H. K. Barton and James L. Erickson. *Tool & Die Journal,* v. 14, Nov. 1948, p. 64-66, 90.

14a-171. Les procédés de fabrication des usines metallurgiques suisses. 2. La fonderie. (Fabrication Procedures in the Swiss Metallurgical Industry. 2. The Foundry.) (Also in German.) O. H. C. Messner. *Pro-Metal,* v. 3, May 1948, p. 57-67.

Described and illustrated. (To be continued.)

14a-172. Select Mold and Core Wash to Meet Casting Conditions. J. A. Ridderhof. *American Foundryman,* v. 14, Nov. 1948, p. 55-58.

Procedure and selection recommendations.

14a-173. Specialized Foundry Control for Composite Castings. Arthur K. Higgins. *Metal Progress,* v. 54, Nov. 1948, p. 679-682.

Problems involved in casting an alloy base around a group of prefabricated inserts which must bear tensile and fatigue loads, specifically the fixing of forged turbine blades into cast wheel segments. How proper techniques can reduce foundry losses to 0.2% over long periods.

14a-174. Handling Materials in Metal Charging. Robert H. Herrmann. *Foundry,* v. 76, Dec. 1948, p. 80-85, 218, 221, 224.

Equipment used for charging metals in the foundry melting department.

14a-175. New Mold Coating Widens Centrifugal Casting Use. John Anthony. *Iron Age,* v. 162, Dec. 2, 1948, p. 94-98.

A metal-mold centrifugal-casting technique using a special type of refractory coating which permits more exact and orderly distribution of metal in the spinning mold. This development makes commercially feasible the production of long tubular shapes in stainless, toolsteels, and nonferrous metals, as well as the usual range of cast steel and cast iron.

14a-176. Foundry Sands Evaluated—Naturally Bonded Vs. Synthetic Sands. C. A. Sanders. *Refractories Journal,* v. 24, Oct. 1948, p. 369-376.

Previously abstracted from *American Foundryman,* v. 14, Sept. 1948, p. 45-49. See item 14a-154, 1948.

14a-177. Chemically Coated Sand; A New Bonding and Refractory Process for Foundries. W. A. Turner. *Iron and Steel,* v. 21, Nov. 1948, p. 483-484.

Process invented by Bonheur M. Weston and exhibited at 52nd annual A.F.A. meeting, Philadelphia, May 1948, in which molding sand is coated with a plasticized hydrocarbon, with a consequent reduction by roughly 50% of the conventional additions of clay and water, and the complete elimination of coal dust.

14a-178. Abreuvage des noyaux. (Soaking of Cores.) Pierre Nicolas. *Fonderie,* v. 32, Aug. 1948, p. 1283.

The penetration of molten metal into the pores of foundry cores and its prevention.

14a-179. Precision Casting—New Tool in Metal Working. *Inco Magazine,* v. 22, No. 4, 1948, p. 4-9.

Process and applications.

14a-180. Adequate Dust Control Keeps Foundry Clean. Allen D. Brandt. *American Foundryman,* v. 14, Dec. 1948, p. 35-42.

Equipment and methods. 12 ref.

14a-181. Wood Flour Additions Aid in Foundry Sand Control. C. A. Sanders. *American Foundryman,* v. 14, Dec. 1948, p. 50-54.

14a-182. Principles of Precision Investment Casting. Kenneth Geist and Robert M. Kerr. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A146-A162; discussion, p. A163-A168.

Previously abstracted from *Foundry Trade Journal,* v. 82, July 17, 1947, p. 247-254; July 24, 1947, p. 269-273; July 31, 1947, p. 271-296. See items 14-231, 14-233 and 14-244, 1947. Also appeared as advance copy No. 882.

14a-183. Some Notes on Feeding. S. L. Finch. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A87-A97, discussion, p. A97-A100.

Previously abstracted from *Foundry Trade Journal,* v. 82, July 31, 1947, p. 297-303; Aug. 7, 1947, p. 319-324. See items 14-237 and 14-250, 1947. Also appeared as advance copy 877.

14a-184. Some Notes on the Surface Drying of Moulds. A. Cracknell and F. Cousans. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A201-A213; discussion, p. A213-A217.

Previously abstracted from *Foundry Trade Journal,* v. 82, Aug. 7, 1947, p. 313-315; Aug. 14, 1947, p. 343-347; Aug. 21, 1947, p. 365-369. See item 14-248, 1947.

14a-185. Precision Casting of High Melting-Point Alloys Containing Nickel. H. Evans, P. S. Cotton, and J. Thexton. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A136-A145; discussion, p. A163-A168.

Previously abstracted from *Foundry Trade Journal,* v. 82, July 3, 1947, p. 205-210; July 10, 1947, p. 223-227. See items 14-218 and 14-219, 1947.

14a-186. Principles of Precision Investment Casting. Kenneth Geist and Robert M. Kerr, Jr. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 17-33.

Previously abstracted from *Foundry Trade Journal,* v. 82, July 17, 1947, p. 247-254; July 24, 1947, p. 269-273; July 31, 1947, p. 291-296. See items 14-231, 14-233, 14-244, 1947.

14a-187. Chemically Treated Sand; a Molding Sand Process With a Resin Bond. T. W. Curry. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 39-52.

A process for chemically coating foundry sands with a microthin film of carbon resin for refractory and bonding properties. The chemical is a viscous liquid containing an almost pure carbon resin, a solvent, and water. The product is claimed to have better sand flowability than other synthetic sands. See item 14-186, 1947.

14a-188. Heat Transfer; A.F.A. Committee Report. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 53-75; discussion, p. 75-76.

Consists of Report of the Committee Chairman, by H. A. Schwartz; Influence of Properties on Solidification of Metals, by Victor Paschkis; Thermal Conductivities of Three Sands, by C. F. Lucks, O. L. Linebrink and K. L. Johnson. Freezing Rate of White Cast Iron in Dry Sand Molds, by H. A. Schwartz; Solidification Rates of Aluminum in Dry Sand Molds, by H. Y. Hunsicker; and Studies on Solidification of Castings—Approximate Equation for Steel Castings, by Victor Paschkis. This report and each of its sections have been previously abstracted from preprint. See items 14a-34, 35, 36, 72; 14b-29, 30; 14d-15.

14a-189. Density of Molding Sand. H. W. Dietert, H. H. Fairfield, E. J. Hasty. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 175-189; discussion, p. 189-190.

Previously abstracted from preprint. See item 14a-32, 1948.

14a-190. A Study of the Precision of Sand Test Data. Robert E. Morey and Carl G. Ackerlind. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 288-294; discussion, p. 294-295.

Previously abstracted from preprint. See item 14a-29, 1948.

14a-191. Calculating Sizes of Gates and Risers. Nathan Janco. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 296-299; discussion, p. 299-300.

Also appeared as preprint No. 47-48. Previously abstracted from *American Foundryman,* v. 11, June 1947, p. 57-60. See item 14-187, 1947.

14a-192. Evaluation of Core Knockout. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 313-325; discussion, p. 325.

Previously abstracted from preprint. See item 14a-33, 1948.

14a-193. Physical Properties of Molding Sands. G. R. Gardner. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 332-336

Also appeared as preprint No. 47-13. Previously abstracted from *American Foundryman,* v. 11, June 1947, p. 34-38. See item 14-185, 1947.

14a-194. Survey of Foundry Coke Characteristics. D. E. Krause and H. W. Lownie, Jr., *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 337-346; discussion, p. 346-350.

Published information on foundry coke, and data selected from tests conducted on foundry cokes in connection with cupola studies. 154 ref. See item 14-215, 1947.

14a-195. Mechanized Malleable Foundry Finishing and Inspection. D. F. Sawtelle. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 388-390; discussion, p. 391.

Previously abstracted from *American Foundryman,* v. 11, June 1947, p. 44-46. See item 7-257, 1947.

14a-196. Feeding of Metal Castings; Derivation of a General Equation for Gating Castings and Experimental Evidence in Support of Same. A. F. Faber Jr., and D. T. Doll. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 461-474; discussion, p. 474-475.

Previously abstracted from preprint. See item 14a-31, 1948.

14a-197. Foundry Sand Laboratory. O. Jay Myers. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 493-498; discussion, p. 499.

Organization, equipment, methods, and 11 reasons why every foundry should have such a laboratory. Previously abstracted from *American Foundryman,* v. 11, April 1947, p. 123-124. See item 14-111, 1947.

14a-198. Liquid Phenolic Casting Resins for Foundry Patterns. C. R. Simmons. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 516-519; discussion, p. 519.

Also appeared as preprint No. 47-14, 1947. Previously annotated from *American Foundryman,* v. 11, May 1947, p. 94-96. See item 14-152, 1947.

14a-199. Mechanized Foundry Design and Operating Phases. C. O. Bartlett. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 546-556; discussion, p. 556-557.

Previously annotated from *American Foundryman,* v. 11, April 1947, p. 82-90. See item 14-110, 1947.

14a-200. Effect of Coke Quality on Cupola Melting. D. E. Krause. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 620-625.

Previously abstracted from *American Foundryman,* v. 12, Sept. 1947, p. 44-49. See item 14-289, 1947.

14b—Ferrous

14b-1. Ferrous Die Castings. C. D. Pollard, H. A. Redshaw, and C. A. Payne. *Foundry Trade Journal,* v. 83, Nov. 20, 1947, p. 237-245; Nov. 27, 1947, p. 259-264; discussion, p. 264-268.

The Eaton Erb continuous casting process and equipment. Auxiliary equipment and performance data.

14b-2. Steel Turbine Castings; Production Problems. John A. Wettergreen *American Foundryman,* v. 12, Dec. 1947, p. 51-54.

Experience in the foundries and pattern division of General Electric.

14b-3. Steel. Charles W. Briggs. *Foundry,* v. 76, Jan. 1948, p. 66-69, 183-184, 186.

Important casting developments since the end of the war. 38 ref.

14b-4. Malleable Iron. James H. Lansing. *Foundry,* v. 76, Jan. 1948, p. 74-77.

Important casting developments since the end of the war.

14b-5. Gray Iron. James S. Vanick. *Foundry,* v. 76, Jan. 1948, p. 82-89, 132, 134, 136, 138, 140, 142.

Important casting developments since the end of the war.

14b-6. Designs Small Cupola for Fast Melting. V. V. Rogers. *Foundry,* v. 76, Jan. 1948, p. 216-218, 220.

Construction and operation of Australian cupola designed to carry approximately 2800 lb. when loaded to the charging door. By calculation and by experiment, the output was increased from 3360 to 6160 lb. per hr. Repair procedures.

14b-7. The Manufacture of Cast-Steel Bomb-Bodies. Percy H. Wilson. *Engineering,* v. 164, Nov. 21, 1947, p. 501-503; Nov. 28, 1947, p. 525-527; Dec. 5, 1947, p. 550-552.

Previously abstracted from *Foundry Trade Journal.* See 14-361, R.M.L., v. 4, 1947 (*Metals Review,* Jan. 1948).

14b-8. Foundries in Spain. A. J. Gibbs Smith. *Iron and Steel,* v. 20, Dec. 1947, p. 643-644.

Use of locally available fuel by six ferrous foundries in the Barcelona area during the war when imports were shut off. Results are given mainly in terms of tonnage of castings per worker, per cent rejects, and fuel consumption.

14b-9. Carbon Control; Influencing the Degree of Pick-Up in the Cupola. W. W. Levi. *Iron and Steel,* v. 20, Dec. 1947, p. 659-662.

Previously abstracted from *American Foundryman.* See 14-317, R.M.L., v. 4, 1947 (*Metals Review,* Dec. 1947).

14b-10. Some Applications of Asbestos in the Foundry. F. J. McCulloch. *Foundry Trade Journal,* v. 83, Dec. 11, 1947, p. 309-310.

Certain technical difficulties encountered in the production of three different types of iron castings were finally overcome by the use of asbestos yarn or sheet.

14b-11. The "C" Process of Foundry Mold Production. *Machinery* (London), v. 71, Dec. 18, 1947, p. 693. Based on F.I.A.T. Report No. 1168.

Method especially suitable for the casting of small pipe fittings which were formerly made in malleable iron but can now be cast in steel.

14b-12. Pattern Equipment for Mechanized Production in a Light Castings Foundry. James A. McIntosh. *Foundry Trade Journal,* v. 83, Dec. 18, 1947, p. 327-330.

14b-13. Cast Iron Roller Conveyers. J. Timbrell. *Foundry Trade Journal,* v. 83, Dec. 18, 1947, p. 333-336.

Method for making rollers which require no machining before assembly.

14b-14. Centrifugal Casting of Carbon and Stainless Steel Tubes. J. W. Moore and J. W. MacKay. *Machinery,* v. 54, Jan. 1948, p. 181-183.

Previously abstracted from July 1947 issue of *Mechanical Engineering*. See 14-203, R.M.L., v. 4, 1947 (*Metals Review*, Aug. 1947).

14b-15. Centrifugally Cast Steel. *Engineer*, v. 184, Dec. 26, 1947, p. 600.

Critically reviews recent papers.

14b-16. Centrifugal Casting Proves Advantageous for Iron Piston Rings. Tracy C. Jarrett and Erle J. Hubbard. *Materials & Methods*, v. 27, Jan. 1948, p. 79-82.

Development of a new alloy cast iron improved by new casting and heat treating procedures. Properties and structures are compared with those of standard gray cast iron piston-ring materials.

14b-17. Uses of Exothermic Cores in Pouring Stainless Steel. Maurice Beam. *Steel*, v. 122, Jan. 26, 1948, p. 76, 78.

In addition to exothermic cores or ring inserts placed under feeding heads, an exothermic powder is placed on top of the risers immediately after filling the mold. This compound generates additional heat which maintains fluidity of the metal so that feeding continues during solidification—the riser being the last to freeze. Composition of the exothermic material is not indicated.

14b-18. Centrifugal Casting Process Applied to Stainless and Carbon Steel Tubes. J. W. Moore and J. W. MacKay. *American Foundryman*, v. 13, Jan. 1948, p. 41-49.

Previously abstracted from *Mechanical Engineering*, July 1947. See 14-203, R.M.L. v. 4, 1947 (*Metals Review*, Aug. 1947).

14b-19. Priciny Vzniku Spendlikovych Poru u Ocelolitiny. (Causes for Formation of Pinholes in Steel Castings.) Josef Pribyl. *Hutnické Listy* (Metallurgical Topics), v. 2, no. 5, 1947, p. 106-110.

Tests were conducted to determine the causes of pinhole formation. Sands of various compositions were used, having a wide range of properties.

14b-20. Mechanization Speeds Malleable Output. H. Lyon Day. *Iron Age*, v. 161, Feb. 5, 1948, p. 64-69.

Equipment and procedures at the malleable iron foundry of Auto Specialties Mfg. Co.

14b-21. The Manufacture of Some Large Castings for Marine Engineering. D. H. Young. *Foundry Trade Journal*, v. 84, Jan. 8, 1948, p. 27-33; Jan. 15, 1948, p. 59-63.

Patternmaking and coremaking, and casting of large turbine castings of complex design.

14b-22. Old Foundry Has Face Lifted. Pat Dwyer. *Foundry*, v. 76, Feb. 1948, p. 76-79, 112, 114.

Modernization of 41,000 sq. ft. ferrous foundry.

14b-23. Internal Risers on Steel Castings. Turney Shute. *Foundry*, v. 76, Feb. 1948, p. 82-83, 236.

Advantages and disadvantages for different types and sizes of castings. (Presented at First All-Canadian A.F.A. Chapter Conference, Toronto, Canada.)

14b-24. Cupola Charge Calculations. Richard W. Heine. *Foundry*, v. 76, Feb. 1948, p. 88-89, 172, 174, 176.

An example of one method for calculating a metal charge to melt down a gray cast iron of a particular chemical composition.

14b-25. Magnesium Use in an Iron Foundry. A. J. Marotta. *Foundry*, v. 76, Feb. 1948, p. 208-210, 212, 214.

Use of magnesium flasks, core plates and radiator vent boards at Utica Radiator Corp., Utica, N. Y.

14b-26. Spendlikové Pory, Jejich Vznik a Pripadné Odstraneni (Pinholes, Their Formation and Apparent Elimination.) Jan Kraus. *Hutnicke Listy*, (Metallurgical Topics), v. 2, Dec. 1947, p. 129-138.

The effect of pouring temperature and moisture content of the molding sand or bentonite on pinhole formation in ferrous castings. Presents theoretical discussions based on the interaction of Al, O_2, Si, and H_2; and also on the formation of CO by reaction of Fe and C, both possible mechanisms of pinhole formation. The latter is preferred by the author. Effects of reducing or oxidizing conditions in the mold cavity during pouring and the effect of diffusion of gases.

14b-27. Temperature Distribution in Metal Molds. M. C. Udy and H. D. McIntire. *American Foundrymen's Assoc., Preprint No.* 47-6, 1947, 12 pages.

Pertinent data obtained from an investigation of several variables affecting the above. Mold thickness, mold coating thickness, casting thickness, cooling media, cooling-water rate, mold heat conductivity, and finned vs. plain plates were studied by measuring the temperature distribution in a test plate at intervals following the pouring of a casting on that plate.

14b-28. Silicon Carbide Inoculation of Gray Cast Iron. E. A. Loria, H. D. Shephard, and A. P. Thompson, *American Foundrymen's Assoc., Preprint No.* 47-49, 1947, 8 pages.

Effect of above on the normal

chilling tendencies of unalloyed and alloyed cast iron.

14b-29. Freezing Rate of White Cast Iron in Dry Sand Molds. H. A. Schwartz. *American Foundrymen's Assoc., Preprint No.* 47-55, 1947, p. 14-15.

14b-30. Studies on Solidification of Castings. Victor Paschkis. *American Foundrymen's Assoc., Preprint No.* 47-55, 1947, p. 22-23.

14b-31. Pressure Feeding of Steel Castings. W. T. W. Shute. *American Foundryman*, v. 13, Feb. 1948, p. 60-62.

Previous methods, and new method developed by Jazwinski and Finch in England, by which pressures up to 350 psi. are obtained by use of pellets of an exothermic, gas-evolving compound. Methods for use of the method, especially for proper riser design.

14b-32. Current Melting Problems in the Gray Iron Foundry. Donald J. Reese. *Foundry*, v. 76, March 1948, p. 78-79, 184, 186, 188.

A practical discussion of various technical and economic problems, mainly dealing with use of substitute raw materials made necessary by shortages.

14b-33. Steel Foundry Uses Wood Plate on Core Blower. Pat Dwyer. *Foundry*, v. 76, March 1948, p. 82-84, 224, 226, 228, 230, 232, 234.

Substitution of a plywood blow-plate for the usual metal plate at a jobbing foundry.

14b-34. Conversion of Cylinder Cover From Floor to Machine Molding. O. Smith. *Foundry Trade Journal*, v. 84, Feb. 19, 1948, p. 177-179.

Methods used to mechanize production of cast iron part.

14b-35. Cupola Operation With Heated Blast. S. W. Healy. *American Foundryman*, v. 13, March 1948, p. 44-45.

Advantages.

14b-36. Elimination of Anneal for Light Gray Iron Castings. R. G. McElwee. *Vancoram Review*, v. 5, no. 3, 1948, p. 19.

Alternative described is use of graphitizing type of inoculant. Addition of a prescribed amount, based on accompanying chart, will serve to eliminate the chilled edge by causing the casting to graphitize to gray iron uniformly throughout the mold. The cost of treatment is claimed to be only a small fraction of the cost of annealing. Also the casting quality should be better because of the uniformity of structure which reduces shrinkage and casting stresses.

14b-37. Canadian Steel Foundry Practice. S. L. Gertsman. *Canadian Mining and Metallurgical Bulletin*, v. 41, March 1948, p. 137-143.

To be presented at annual meeting, Canadian Institute of Mining and Metallurgy, Vancouver, B. C., April 1948.

14b-38. Pioneer Swedish Centrifugal Pipe Foundry. *Foundry Trade Journal*, v. 84, March 4, 1948, p. 219-221.

14b-39. Doubles Foundry Capacity With Same Floor Area. William G. Gude. *Foundry*, v. 76, April 1948, p. 72-77, 118, 120.

Accomplished by Olney Foundry Division, Link-Belt Co., Philadelphia, which produces a wide variety of shapes, sizes, and compositions of gray-iron castings.

14b-40. Desulphurizing With Soda Ash. W. W. Levi. *Foundry*, v. 76, April 1948, p. 78-79, 176, 178, 180, 182, 184, 186.

Use of large percentages of scrap is essential at all times because of economics and obligatory at present because of pig-iron shortage. This results in high sulphur content which is satisfactorily controlled by use of fused soda ash.

14b-41. Molding Sheaves in Dry Sand Cores. William Pink. *Foundry*, v. 76, April 1948, p. 88-89.

Methods for molding 8-ft. diameter cast-iron sheave wheels at Manitoba Bridge & Iron Works Ltd., Winnipeg, Canada.

14b-42. Better Castings for Better Valves Through Mechanization. Charles H. Martin. *Pig Iron Rough Notes*, Winter 1948, p. 22-26.

Procedures and equipment for casting of iron valve parts.

14b-43. Manhole Covers. A. R. Parkes. *Foundry Trade Journal*, v. 84, March 18, 1948, p. 275-276.

Production in a British foundry.

14b-44. A Vent That Was Missed. W. Gudgeon. *Foundry Trade Journal*, v. 84, March 18, 1948, p. 278.

Reason for large percentage of rejects in casting of gas burners.

14b-45. Impurities in Steel Foundry Knockout Sand. H. E. Crivan. *Foundry Trade Journal*, v. 84, March 25, 1948, p. 293-301.

Results of an extensive study of the effect of impurities in sand on the roughness of castings, data resulting from examination and analysis of test castings.

14b-46. Seventh Annual Report on Investigation of Properties of Steel Sands at Elevated Temperatures. D. C. Williams and P. E. Kyle. *Transactions of the American Foundry-*

men's Association, v. 55, 1947, p. 607-619.

Work on the Sand Research Project sponsored by the Sand Division of the A.F.A. which has been completed during 1946 at Cornell University. The research furnace; results of a study of reproducibility of hot-compressive-strength test data; determination of exposure time required to heat all parts of the test specimen to the same temperature; determination of hot compressive strength vs. test temperature for several sand mixtures.

14b-47. Pratique Recente de la Fabrication au Cubilot de la Malléable a Coeur Noir en Tchécoslovaquie. (Recent Practice in the Cupola Production of Black-Heart Cast Iron in Czechoslovakia.) Milos Knotek. *Fonderie,* Dec. 1947, p. 961; discussion, p. 962.

Includes chemical composition.

14b-48. Rings, Pistons and Liners; A Review of the Production Methods Employed by Hepworth and Grandage, Ltd. *Automobile Engineer,* v. 38, Jan. 1948, p. 27-39.

Procedures and equipment for casting, machining, and inspection. Plain and alloy cast irons are used.

14b-49. Giant Castings for Grand Coulee. *Western Machinery and Steel World,* v. 39, April 1948, p. 82-85.

Production of castings weighing 19 to 35 tons apiece for immense centrifugal pumps.

14b-50. Flywheel for Brazil. *Western Machinery and Steel World,* v. 39, April 1948, p. 89.

Casting of 11-ton flywheel for a 900-hp. diesel.

14b-51. Advances in British Steel Casting Technique. *British Steelmaker,* v. 14, April 1948, p. 159-164.

Practice at one foundry.

14b-52. Steel Castings; Straight-Line Production at K. & L. Steelfounders. *Iron and Steel,* v. 21, April 1948, p. 124-128.

14b-53. Gray Iron Foundry Modernized. V. E. Hillman. *Iron Age,* v. 161, April 22, 1948, p. 84-89.

Intensive mechanization of processing operations, coupled with modern materials-handling techniques and effective dust-control equipment at modernized gray-iron foundry.

14b-54. Modernized Foundry Stresses Good Working Conditions. *Foundry,* v. 76, May 1948, p. 120-125, 280, 282, 284.

Equipment, procedures, and layout of new ferrous foundry.

14b-55. Observations on Knock-Off Risers as Applied to Steel Castings. S. W. Brinson and Joseph A. Duma. *American Foundrymen's Association, Preprint No.* 48-9, 1948, 15 pages.

Knock-off risers are differentiated from necked-down risers. Some quantitative information is presented showing important relationships among the variables which govern the successful use of knock-off risers in cast-steel applications. 10 ref.

14b-56. Contraction and Distortion in Gray Iron Castings. E. Longden. **American Foundrymens' Association, Preprint No.** 48-10, 21 pages.

Problems involved in cooling large castings without excessive distortion, especially for castings of unsymmetrical design. Test procedures for obtaining a continuous record of dimensional changes during cooling. Machine-tool beds, boring bars, and gear-blank castings were tested. Results led to adoption of localized air cooling for the beds. A "cambergraph" is presented which may be used to calculate allowances for shrinkage and contraction of a variety of castings. Differences between steel and cast iron are illustrated by application to a typical gear-blank casting.

14b-57. Causes of Rat-Tail Casting Defect. *American Foundrymen's Association, Preprint No.* 48-15, 1948, 21 pages.

The rat-tail phenomenon was studied by the A.F.A. committee on physical properties of iron-foundry molding materials at elevated temperatures by making flat gray-iron castings in a number of different sands. There were indications that metal pouring temperatures, green strength, and sand moisture content were not major causes. Expansion and hot strength at 1000° F. appear to be directly correlated to the tendency of a sand to produce rat-tails.

14b-58. Studies of Solidification of White Iron Castings. Victor Paschkis. *American Foundrymen's Association, Preprint No.* 48-17, 1948, p. 9-11.

Previous work has been concentrated mainly on steel castings. It has been shown that freezing rates obtained by the electric analogy method check well with results obtained from bleeding tests. Data for white iron castings also show reasonably good agreement between the two methods.

14b-59. Study on Solidification of Steel Spheres. Victor Paschkis. *American Foundrymen's Association, Preprint No.* 48-17, 1948, p. 11-15.

Previous work, with the Heat and Mass Flow Analyzer on solidification of castings was limited to slabs which were so big that the end effect could be neglected. It appeared desirable to study the solidification of steel spheres by comparing these results with those of Briggs and Gezelius in order to establish cooling curves for spheres. Experiments reported were concentrated on 4½ and 6-in. spheres. Results show good agreement with those of Briggs and Gezelius, except for 2740° F., which is near the liquidus temperature.

14b-60. Applications of Correlation in the Malleable Iron Foundry. Robert G. Seidel. *American Foundrymen's Association, Preprint No.* 48-22, 1948, 4 pages.

Correlation techniques and their possibilities for the above.

14b-61. New Centrifugal Process Produces Soil Pipe. R. L. Farabee. *American Foundryman,* v. 13, April 1948, p. 134-136.

Development of a split permanent metal-mold process which produces a good quality of pipe without subsequent heat treating, and at an extremely high rate of production. It was found that if the pipe were removed from the mold as soon as it had solidified sufficiently to hold its shape, a primary metallographic structure containing a pearlitic matrix and with the remaining carbon in a preferred form of graphite would be obtained without the necessity of annealing. (Presented at the 16th Annual Foundry Practice Conference, A.F.A., Birmingham District Chapter, Birmingham, Ala. Feb. 12-14, 1948.)

14b-62. Coke Boosters. A Fallacy in Cupola Operation? *American Foundryman,* v. 13, April 1948, p. 137-139.

Use and misuse of coke boosters and recommended procedures as determined from experience. Second of a series, dealing with modern cupola operation, sponsored by the Cupola Research Committee of A.F.A. Other reports will appear in future issues.

14b-63. Belgian Foundry Produces Wear-Resistant Cast Iron. G. Halbart. *American Foundryman,* v. 13, April 1948, p. 140-141.

Equipment and procedures at Les Fonderies Magotteaux, Vaux-Les-Liege, Belgium, in production of hard cast irons and hypereutectoid steels for wear resistance.

14b-64. Brazilian Foundry Produces Chilled Car Wheels. M. M. Siqueira. *American Foundryman,* v. 13, April 1948, p. 150-152.

14b-65. Recent Technical Developments in the Production of Iron Castings. E. C. Dickinson. *Foundry Trade Journal,* v. 84, April 8, 1948, p. 341-344.

Nodular iron, cleaning, substitute materials, and dielectric heating. (To be concluded.)

14b-66. Melting Iron in Gas-Fired Crucibles. *Iron Age,* v. 161, April 29, 1948, p. 91-93.

Above practice is said to permit unusually close control of composition. Foundry described utilizes this method for producing irons with sulphur as low as 0.04%. This metal is used in producing wrenches, gears and other machine parts. Construction of the furnaces, particularly with respect to types of refractories used and fuel consumption.

14b-67. Control of Gray Iron Casting Defects. W. B. McFerrin. *Canadian Metals and Metallurgical Industries,* v.11, April 1948, p. 17-19, 34-35, 39.

Recommended procedures for reduction of defects to a minimum.

14b-68. Recent Technical Developments in the Production of Iron Castings. (Concluded.) E. C. Dickinson. *Foundry Trade Journal,* v. 84, April 15, 1948, p. 369-370.

Dielectric core drying, bonding materials, core wires, and drying shells.

14b-69. Magnesium Equipment for an Iron Foundry. A. J. Marotta. *Modern Metals,* v. 4, May 1948, p. 26-27.

See abstract from *Foundry,* v. 76, Feb. 1948, p. 208-210, 212, 214. See item 14b-25, 1948.

14b-70. Cupola Operations Improved With Oxygen-Enriched Blast. W. C. Wick. *American Foundryman,* v. 13, May 1948, p. 64-74.

Use of oxygen has proven successful for increasing melting rates and tapping temperatures with a given coke ratio and blast volume. Most important of all, oxygen is useful in overcoming bridging and cold metal conditions and often can be used to save a heat from freezing in the furnace, and as a control to regulate melting rate and tapping temperature.

14b-71. Pattern Equipment; Mechanized Production of Light Castings. James A. McIntosh. *American Foundryman,* v. 13, May 1948, p. 81-83.

Previously abstracted from *Foundry Trade Journal,* v. 83, Dec. 18, 1947, p. 327-330. See item 14b-12, 1948.

14b-72. Slag Control is Important in Cupola Operation. *American Foundryman,* v. 13, May 1948, p. 109-110.

Third of a series dealing with modern cupola operation, sponsored by the Cupola Research Committee of A.F.A. Flux-material additions, iron oxide in slag, effect of slags on grain size, and slag color as a control factor. 11 ref.

14b-73. Formmassor for rasandsgjutning av Stal. Laboratorieundersokningar over Egenskaper vid Rumstemperatur. (Green Sand for Steel Casting. Laboratory Investigation of Properties at Room Temperature.) Karl-Gustaf Sandstrom. *Jernkontorets Annaler,* v. 132, March 1948, p. 59-90.

How green strength and permeability of the sands change with percentage of water and binder and with time after ramming. The sands investigated were chiefly composed of crushed sandstone or fine-grained silica sand and the following binders: cereal, dextrin, sulphite lye, water-glass, pine resin, and bentonite.

14b-74. The Loam Molding of Rope-Barrel Castings. D. Robertson. *Foundry Trade Journal,* v. 84, April 29, 1948, p. 413-418; May 6, 1948, p. 445-447; discussion, p. 447-448.

Methods used in casting of 20-ton cable drums for floating cranes. (Presented at meeting of Bristol and West of England Branch, Institute of British Foundrymen.)

14b-75. The Newcast Foundry. A. R. Parkes. *Foundry Trade Journal,* v. 84, May 6, 1948, p. 441-444.

Layout and facilities of British foundry.

14b-76. Oxygen and Cupola Operation. A. W. Gregg. *Foundry,* v. 26, June 1948, p. 86-90.

Results obtained at Armour Research Foundation.

14b-77. A Review of Progress in Gray Iron. Jack H. Schaum. *Foundry,* v. 26, June 1948, p. 98-101, 240-242, 244, 246, 248, 250.

Solidification characteristics; effects of alloying elements; microstructure; sand. 29 ref.

14b-78. Canadian Steel Foundry Practice. S. L. Gertsman. *Canadian Metals & Metallurgical Industries,* v. 11, May 1948, p. 22-26, 40-41.

Trend of developments. 12 ref.

14b-79. The Constant-Charge System of Cupola Operation. W. W. Braidwood. *Foundry Trade Journal,* v. 84, May 6, 1948, p. 435-439; May 13, 1948, p. 465-468.

System for modification of base cupola metal by spout additions to suit a range of castings.

14b-80. Centrifugal and Precision Steel Castings for Aircraft. J. F. B. Jackson. *Engineering,* v. 165, May 21, 1948, p. 481-484.

Application to manufacture of asymmetrical parts.

14b-81. Effect of Coke Quality on Blast Furnace Iron Tonnage. E. J. Gardner, *American Iron and Steel Institute, Preprint,* 1948, 13 pages.

A definite change in the coking quality of low or high volatile coal used in the blend produces a definite change in physical and chemical properties of the resulting coke with resulting effects on efficiency of iron production.

14b-82. Korrosionsbeständiger Stahlguss fur die chemische Industrie und die Lebensmittelindustrie. (Corrosion Resistant Steel Castings for the Chemical and Food Industries.) Hans Hubscher. *Chimia,* v. 2, April 10, 1948, p. 78-82.

Production and properties of martensitic, ferritic, and austenitic stainless steels, and three methods of preventing intercrystalline corrosion and the resulting electrolytic action of the carbides on the grains.

14b-83. The Use of Basic Grade Pig Iron in Iron Founding. J. E. Rehder. *Canadian Metals & Metallurgical Industries,* v. 11, June 1948, p. 24; 30.

Principles involved in using any grade of pig iron differing from the foundry grade normally used. Various grades of pig iron and metallurgy of the process.

14b-84. Cupola Spout to Box Car in 75 Minutes. William G. Gude. *Foundry,* v. 76. July, 1948, p. 68-73, 134, 136.

Equipment and procedures used in the new gray-iron foundry.

14b-85. Centrifugal Casting of Soil Pipe. R. L. Farabee. *Foundry,* v. 76, July 1948, p. 88-91, 238-239.

Abstracted from *American Foundryman,* v. 13, April 1948, p. 134-136. See item 14b-61, 1948.

14b-86. Malleable Cast Iron. H. G. Hall. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B46-B59.

A general discussion. 20 ref.

14b-87. Gueuses et gueusets. (Pig Iron and Small Pig Iron). Guy Henon and Eraldo Guenzi. *Fonderie,* v. 28, April 1948, p. 1119-1123.

Use of casting machines producing pig-iron billets about 30-lb. size is said to eliminate a series of defects generally present in the finished products when ordinary pig iron (cast in sand molds) is used.

14b-88. A Substitute Fuel for Cupola Use. W. J. Reagan and C. C. Wright. *Foundry,* v. 76, Aug. 1948, p. 74-75, 138, 141-142.

Experiences in use of anthracite for commercial cupola operation, including cost data. Methods for temperature and fluidity measurement.

14b-89. Centrifugal Casting of Steel. John Howe Hall. *Foundry,* v. 76, Aug. 1948, p. 76-77, 176, 178, 180, 182, 184, 186, 188, 190, 193, 197-198.

The true centrifugal method, in which liquid steel is poured into a cylindrical mold revolving so fast that the metal is held by centrifugal force against the inside of the mold, and solidifies into a tube, without use of a central core. (To be continued.)

14b-90. Continuous Casting of Semifinished Steel. T. W. Lippert. *Iron Age,* v. 162, Aug. 19, 1948, p. 72-80, 159-161.

Method of casting steel from liquid phase to semifinished shape, in one simple, inexpensive machine.

14b-91. Large-Scale Production of Miscellaneous Castings in High Duty Grey Iron. *Nickel Bulletin,* v. 21, May 1948, p. 62-65.

Foundry methods and production problems.

14b-92. Centrifugal Casting. J. E. Hurst. *Iron and Steel,* v. 21, Aug. 1948, p. 355-361.

Development and application.

14b-93. Use of Synthetic Sand for Cast Magnets. R. S. Turner. *Foundry Trade Journal,* v. 85, Aug. 12, 1948, p. 153-154.

Results of experiments conducted with the objects of reducing facing-sand costs, of obtaining smoother finishes on the castings, and of finding a sand suitable for some very small magnets which had to meet close tolerances in the as-cast condition. Compositions of suitable mixes.

14b-94. Anthracite-Coke Mixtures Used in High Speed Cupola Melting. C. C. Wright and W. J. Reagan. *American Foundryman,* v. 14, Sept. 1948, p. 37-44.

Successful use of coal in production-melting operations carried on over a great part of 1947. The practice developed is currently in use. Suggestions for improving on the techniques described.

14b-95. Centrifugal Casting of Steel (Cont.) John Howe Hall. *Foundry,* v. 76, Sept. 1948, p. 74-77, 228-230, 232, 234, 236, 238.

True centrifugal process and semi-centrifugal method of producing steel castings. 10 ref. (To be concluded.)

14b-96. Continuous Casting; It May Mean Diversified Steel Production for West. *Western Metals,* v. 6, Sept. 1948, p. 21-22.

Process developed by Republic and Babcock & Wilcox and its potentialities.

14b-97. Core-Moulds for Stainless Steel Castings. R. S. Turner. *Foundry Trade Journal,* v. 85, Sept. 2, 1948, p. 231-232.

Method was developed for making small items required in fairly large numbers at a reasonable cost.

14b-98. Steel Moulding Boxes from Standard Section Channel. A. V. C. White. *Foundry Trade Journal,* v. 85, Sept. 2, 1948, p. 234.

Figure shows method of manufacture of the steel-box parts for foundry use.

14b-99. Vyrobni tolerance odlitku ze sedé litiny. (Gray Cast Iron Production Tolerances.) Vojtech Jares. *Hutnické Listy,* v. 3, March 1948, p. 66-72.

In cooperation with a commercial foundry, the sources of dimensional inaccuracies of gray-iron castings molded with use of wooden patterns were determined. Recommendations for tolerances.

14b-100. Precision Casting with Plastic Patterns—the A.R.D. Process. Herbert Chase. *Iron Age,* v. 162, Oct. 7, 1948, p. 88-94.

Process developed by A.R.D. Corp. as applied at Midwest Foundry to miscellaneous steel castings. It permits an unusually high rate of output with minimum labor requirements. Use of plastic patterns produced in automatic injection machines, automatic mixing of large batches of low-cost slurry, high speed flask filling by use of a hose, and eliminating of precoating of patterns.

14b-101. Modernizing a Malleable Foundry. G. L. White. *Canadian Metals & Metallurgical Industries,* v. 11, Sept. 1948, p. 14-16.

New layout, equipment and procedures for a jobbing foundry.

14b-102. Gating Systems for Metal Casting. William H. Johnson and William O. Baker. *Foundry,* v. 76, Oct. 1948, p. 68-73, 252.

The investigation undertaken to determine the effects of gate design on the flow of liquid steel as a casting is poured. Results indicate that many gating systems do not function in the manner commonly supposed. Use was made of high-speed photography at one thousand frames per sec.

14b-103. Modernizes Sheave Foundry. Paul C. Vogel. *Foundry,* v. 76, Oct. 1948, p. 80-81.

New mechanized foundry equipment, including a three-unit wet dust-collecting system, installed in the West Allis Works of Allis-Chalmers to facilitate production of Texrope sheaves under improved working conditions.

14b-104. Permanent Mold Gray Iron Castings By the Million. Arthur H. Allen. *Foundry,* v. 76, Oct. 1948, p. 82-87, 173-174, 176.

Use of Holley-type permanent mold machine for production of an endless variety of castings ranging in weight from a few ounces up to 15 lb. each.

14b-105. Centrifugal Casting of Steel. John Howe Hall. *Foundry,* v. 76, Oct. 1948, p. 88-91, 183-184, 186, 188, 190, 192, 194, 196, 198.

Recommended practices in the use of the semicentrifugal and centrifugal processes.

14b-106. Adjusting Iron Composition By Addition of Ferroalloy Briquets. John N. Ludwig, Jr. *Foundry,* v. 76, Oct. 1948, p. 115-116.

Typical calculations.

14b-107. Gray Iron Foundry Develops Resin Core Mixtures. T. W. Curry and H. E. Henderson. *American Foundryman,* v. 14, Oct. 1948, p. 40-49.

Details of experimental work involved and of results obtained.

14b-108. Maintaining Carbon-Silicon Ranges in Cupola Melting. *American Foundryman,* v. 14, Oct. 1948, p. 58-59.

Fourth of a series, dealing with modern cupola operation, sponsored by the Cupola Research Committee of A.F.S. Recommended procedures illustrated by methods used by a particular foundry to obtain more uniform results.

14b-109. The Cleaning of Steel Castings. A. B. Lloyd. *Foundry Trade Journal,* v. 85, Sept. 23, 1948, p. 289-296; Sept. 30, 1948, p. 313-316; discussion, p. 316-320.

Details concerning various methods and equipment for the cleaning of steel castings. Discussion of relative ease of removal of sand from various types. Final installment describes working conditions and dust removal.

14b-110. Mass Producing High Tensile Castings. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 94-97.

Production of meehanite castings.

14b-111. Casting Steel and Iron Rolls. *Foundry,* v. 76, Nov. 1948, p. 96-99, 199-200.

Procedures and equipment.

14b-112. Making a Turbine Casing for Hydro-Electric Plant. T. Rigby. *Foundry Trade Journal,* v. 85, Oct. 14, 1948, p. 359-363; discussion, p. 363-364, 367.

Procedures used to make above casting.

14b-113. Centrifugal Castings for Jet Engines. Nathaniel F. Silsbee. *Aero Digest,* v. 57, Nov. 1948, p. 47, 104-105.

Application of British Firth Vickers process to manufacture of stainless-steel circular engine components.

14b-114. Precision Castings; Production Methods for Steel and Cast Iron. Frank Hudson. *Iron and Steel,* v. 21, Oct. 1948, p. 427-430.

Precision castings can be made by at least four different methods; but, for steel, investment casting is the only one which is reasonably satisfactory. Details of this process. (To be concluded.)

14b-115. Patterns and Molding Methods for Steel Castings. John Howe Hall. *Foundry,* v. 76, Nov. 1948, p. 80-83, 212. 214, 216, 218, 220, 222, 224-226.

First of five articles describing available types of patterns, their selection, and molding methods to which each is best adapted. (To be continued.)

14b-116. Problems of Contraction and Distortion in Cast-Iron Castings. E. Longden. *Foundry Trade Journal,* v. 85, Oct. 7, 1948, p. 343-347; Oct. 21, 1948, p. 381-387, discussion, p. 387-389.

Continuation of previous work gives briefly certain data and developments which can be immediately put into practice to help in overcoming some very fundamental difficulties associated with the contraction of ferrous castings carrying members with varying cooling gradients. An automatic contraction-recording mechanism and data on cooling vs. dimensional changes for white and gray-iron bars. In the second part, stress relief by air cooling and use of a camber graph for calculating expected contraction are described.

14b-117. Moulding and Casting a 5-Ton Ingot Mould. J. Steele. *Foundry Trade Journal,* v. 85, Oct. 28, 1948, p. 415-416.

One method of making the core and mold for the above casting.

14b-118. Using Structure Diagrams in Gray Iron Foundries. Sven H. Torreson. *American Foundryman,* v. 14, Nov. 1948, p. 40-47.

Detailed critical analysis and description of the various diagrams and methods for their use proposed by different investigators. Attempts to use these diagrams in a Swedish

foundry, the difficulties encountered, and the modifications made before the present practice was finally adopted. Charging diagrams and tables used in production of three or four types of cupola iron and three types of electric-furnace iron.

14b-119. Increasing Casting Yields; Steel Foundry Uses Exothermic Pipe Eliminator. Paul von Colditz. *American Foundryman,* v. 14, Nov. 1948, p. 48-51.

Use of thermit pipe eliminator, which has proven to be beneficial from both a feeding and a cost point of view, particularly on castings having different sized risers or risers at different levels; also for specific risers such as for wheels with high center hubs.

14b-120. Controlling Malleable Sand Properties. R. P. Schauss. *American Foundryman,* v. 14, Nov. 1948, p. 52-54.

Practice of different types of procedures; effects of fineness of sea coal on properties; and recommended procedures.

14b-121. Steel Foundry Practice and Maintenance. Francis J. Macano. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 98-103; discussion, p. 103-104.

At one steel foundry.

14b-122. Mold Hot-Top is Controlled Automatically. F. A. Furfari. *Foundry,* v. 76, Dec. 1948, p. 188-189.

Unusual method for keeping the head metal in molds for steel rolling mill rolls in a molten state to compensate for shrinkage as the metal in the main part of the mold cools. It involves use of a "hot-top", consisting of two carbon electrodes which maintain an arc on top of the casting between the metal and the electrodes.

14b-123. Mechanizes Malleable Iron Foundry. Pat Dwyer. *Foundry,* v. 76, Dec. 1948, p. 74-77, 190, 192, 194, 196, 198.

Equipment and procedures.

14b-124. Precision Castings; Production Methods for Steel and Cast Iron. (Concluded.) Frank Hudson. *Iron and Steel,* v. 21, Nov. 1948, p. 475-477.

Use of centrifugal force as an alternative to air injection or vacuum pouring in investment casting. Castability of six irons and steels ranging from pure iron to Vitallium. Cleaning and inspection, applications in general engineering, design for economical production, and production methods for cast iron.

14b-125. Patterns and Molding Methods for Steel Castings. II. John Howe Hall. *Foundry,* v. 76, Dec. 1948, p. 92-95, 209-210, 212, 214, 216.

Equipment and methods used in the making of molds for steel castings. (To be continued.)

14b-126. Enriching Cupola Blast with Oxygen Additions. *American Foundryman,* v. 14, Dec. 1948, p. 57-59.

Fourth of a series dealing with modern cupola operation.

14b-127. Controlled Cooling of Ferrous Castings. Emilio Infante Pedroso. *American Foundryman,* v. 14, Dec. 1948, p. 60-62.

Technique which is applied to large castings, for instance acid crucibles about 4 ft. in diameter. Thermocouples are placed in the mold in contact with sections of different thickness. Compressed air or water is used to maintain uniform cooling rates.

14b-128. Gray Iron in the Jobbing Foundry. F. W. Kellam. *Canadian Metals & Metallurgical Industries,* v. 11, Dec. 1948, p. 20-22, 31.

Procedures used to produce different grades consecutively in the cupola.

14b-129. Ferrous Die Casting. C. D. Pollard, H. A. Redshaw, and C. A. Payne. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A30-A43; discussion, p. A43-A46.

Also appeared as advanced copy No. 874. Previously abstracted from *Foundry Trade Journal,* v. 83, Nov. 20, 1947, p. 237-245; Nov. 27, 1947, p. 259-264. See item 14b-1, 1948.

14b-130. Mass Production Methods Applied to the Manufacture of Cast Steel Bomb Bodies. Percy H. Wilson. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A108-A127; discussion, p. A127-A129.

Also appeared as advance copy 879. Previously abstracted from *Foundry Trade Journal,* v. 83, Oct. 23, 1947, p. 149-155; Oct. 30, 1947, p. 177-180; Nov. 6, 1947, p. 197-203; Nov. 13, 1947, p. 219-221. See item 14-361, 1947.

14b-131. The Influence of Production Flow on Moulding Methods in Iron Foundries and Its Effect on P.M.H. and General Efficiency. R. C. Shepherd. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A169-A194; discussion, p. A195-A200.

Also appeared as advance copy No. 883. Previously abstracted from *Foundry Trade Journal,* v. 83, Sept. 1, 1947, p. 21-30, 33; Sept. 18, 1947, p. 43-51; Sept. 25, 1947, p. 67-74. See item 14-308, 1947.

14b-132. Some Effects of Melting Practice on Properties of Medium-Carbon Low-Alloy Cast Steel. J. G. Kura and

N. H. Keyser, *Transactions of the American Foundrymen's Association*, v. 55, 1947, p. 119-131; discussion, p. 131-133.

Previously abstracted from preprint. See item 2b-44, 1948.

14b-133. Temperature Distribution in Metal Molds. M. C. Udy and H. O. McIntire. *Transactions of the American Foundrymen's Association*, v. 55, 1947, p. 208-219; discussion, p. 220.

Previously abstracted from preprint. See item 14b-27, 1948.

14b-134. Reduction in Chilling Tendency Through Silicon Carbide Inoculation of Gray Cast Iron. E. A. Loria, H. D. Shepard, and A. P. Thompson. *Transactions of the American Foundrymen's Association*, v. 55, 1947, p. 301-308; discussion, p. 308.

Previously abstracted from preprint. See item 14b-28, 1948.

14b-135. Cupola Melting Phenomena. E. V. Somers and D. W. Gunther. *Transactions of the American Foundrymen's Association*, v. 55, 1947, p. 441-446; discussion, p. 446-450.

Previously abstracted from preprint. See item 2b-46, 1948.

14b-136. Malleable Foundry Finishing and Inspection. T. Earl Poulson. *Transactions of the American Foundrymen's Association*, v. 55, 1947, p. 451-458; discussion, p. 458-460.

Previously abstracted from preprint. See item 14a-28, 1948.

14c—Nonferrous

14c-1. Die Casting Progress. Part I. The Industry. A. C. Street. *Metallurgia*, v. 37, Nov. 1947, p. 3-6.

(To be continued.)

14c-2. Bronze Sand Castings; Porosity Control and Pressure Tightness. W. A. Baker. *American Foundryman*, v. 12, Dec. 1947, p. 46-49.

Previously abstracted from *Metal Industry*. See 14-222, R.M.L., v. 4, 1947 (*Metals Review*, Sept. 1947).

14c-3. Brass and Bronze. Walter W. Edens. *Foundry*, v. 76, Jan. 1948, p. 78-81, 121.

Important casting developments since the end of the war.

14c-4. Tin Bronzes; Effects of Impurities in the Chill-Cast Condition. K. Winterton. *Metal Industry*, v. 71, Dec. 12, 1947, p. 479-482; Dec. 19, 1947, p. 507-509.

Investigation of the effects of some common impurities on the casting, and mechanical and physical properties, of nine bronzes. An oxidation-reduction treatment was used in melting and the alloys were cast by slow controlled pouring. 17 ref.

14c-5. A Strickled Core for a Lead Pot. W. Gudgeon. *Foundry Trade Journal*, v. 84, Jan. 1, 1948, p. 11.

Core design for production of pots for melting lead.

14c-6. Die Casting Progress. Part II—Zinc Alloy Die Casting. A. C. Street. *Metallurgia*, v. 37, Dec. 1947, p. 67-70.

14c-7. Chromium-Base Alloys; Developments for High-Temperature Service. *Metal Industry*, v. 72, Jan. 9, 1948, p. 28.

Discusses recent paper by Parke and Bens in which elaborate vacuum melting and casting methods are described.

14c-8. Sound Zinc-Base Alloy Die Castings. Ralph F. Burns. *Plating*, v. 35, Feb. 1948, p. 132-134.

Five elements which are essential to the production of sound die castings. Reviews a paper by George Werley which appeared in *ASTM Proceedings* for 1934 and dealt with a study of the effects of changes in die design on the properties of simple test bars. Changes made by Werley to achieve minimum porosity and uniformly high impact values are analyzed.

14c-9. Pacific Brass. *Western Metals*, v. 6, Jan. 1948, p. 30-31.

Equipment and procedures of Pacific Brass Foundry, San Francisco.

14c-10. Making Metal Molds in Minutes. Harvey G. Groehn. *Western Metals*, v. 6, Jan. 1948, p. 42-44.

Use of several of the Wood's metal alloys which are produced by Cerro de Pasco Copper Co. in pouring or spraying for production of precision castings. Properties and applications.

14c-11. Small Castings Are Big Business. *Die Castings*, v. 6, Feb. 1948, p. 31-32.

Production and finishing of toy automobiles and hose nozzles by die casting Zn alloy.

14c-12. Plaster Molds for Casting Intricate Aluminum Torque Converter Parts. Herbert Chase. *Iron Age*, v. 161, Feb. 12, 1948, p. 60-68.

An unusual combination of plaster sections and dry-sand and plaster sections is used to produce the aluminum castings required for the Buick torque converter. This new molding technique, described for the first time, permits production of very intricate castings with high physical properties and with as-cast tolerances as small as ± 0.010 in.

14c-13. L'Execution de Pieces Moulées en Cuivre. (Fabrication of Cast Cop-

per Objects). Georges Blanc. *Fonderie,* Oct. 1947, p. 853-857.

Pure copper is difficult to cast, requiring constant precautions and causing numerous discards. Suggests ways to cut down the number of rejects.

14c-14. Die Casting With City Gas. Arthur Q Smith. *Industrial Gas,* v. 26, Feb. 1948, p. 10, 30.

Procedures and equipment.

14c-15. Modern Die Casting Practice. R. J. Reel. *Steel,* v. 122, Feb. 9, 1948, p. 81-84, 86, 88; Feb. 16, 1948, p. 90-92, 94; Feb. 23, 1948, p. 92-94, 96, 98; March 1, 1948, p. 90-92, 114, 116.

Advantages of die casting nonferrous metals and alloys and melting and metal-handling methods. Various types of casting machines and processes, die construction, and materials. Problems of cooling, grating, and air venting. Die materials and flash removal; application trends.

14c-16. Bronze Founding; A Review of Some Recent Developments. Frank Hudson. *Foundry,* v. 76, March 1948, p. 86-89, 172, 174, 176, 178-179, 182-184. Reprinted from *Metallurgia,* v. 36, Oct. 1947, p. 303-308.

Previously abstracted from above source. See item 14-342, R. M. L., v. 4, 1947.

14c-17. Stampings From Molten Nonferrous Metals. N. A. Sokolov. *Engineers' Digest,* v. 5, Feb. 1948, p. 77-79. Translated and condensed from *Vestnik Inzhenerov i Tehnikov* (News of Engineering and Technology), 1946, p. 301-306.

Process described and diagrammed differs from ordinary die casting or pressure casting in that the pressure is developed in and by the die itself, and not in an external pressure chamber. This eliminates the principal defect of die casting; i.e., the porosity which results from the flow of metal in a high-velocity stream from the pressure chamber into the die.

14c-18. Germans Cast Billets by Continuous Methods. *Aluminum Bulletin,* v. 1, March 1948, p. 3. Based on "Metallurgical Practices in Germany—the Fields of Nonferrous Melting and Coating", PB-81641, Office of Technical Services, U. S. Dept. of Commerce.

Two methods for the continuous casting of round and sheet billets of nonferrous metals used for rolling and extrusion operations.

14c-19. Economics of Die Construction. E. N. Field. *Machinery* (London), v. 72, Feb. 26, 1948, p. 283-287.

Use of interchangeable collets in die-casting dies.

14c-20. Hydropress Cold-Chamber Die-Casting Machine Demonstrated at International Detrola Corp. *Modern Industrial Press,* v. 10, March 1948, p. 6, 8, 36, 54.

One of the largest cold-chamber die-casting machines in existence.

14c-21. Flash Removal as It Affects Die-Casting Design. Herbert Chase. *Die Castings,* v. 6, March 1948, p. 40-44.

Factors involved in die parting and methods used for flash removal with regard to cutting costs and improving appearance by proper design. Illustrated.

14c-22. The Development of Foundry Sand Control. G. L. Harbach. *Foundry Trade Journal,* v. 84, Feb. 26, 1948, p. 195-199; March 4, 1948, p. 223-229.

Problems encountered, and their solutions, during development of a method for a mechanized gray-iron foundry. The developments occurred in the following order: "scabbing" of brass-foundry power-rammed molds on account of low sand permeability; study of theory of interlocking of sand grains and its practical application; reduction of losses during casting and knockout; selection of permeable sand suitable for different sizes of castings; and choice of a suitable coal-dust binder. (To be continued.) (Presented at meeting of East Midlands Branch, Lincoln Section, and Wales and Monmouth Branon, Institute of British Foundrymen.)

14c-23. Custom Die-Casting. *Western Machinery and Steel World,* v. 39, March 1948, p. 104-105.

Procedures and equipment used at Merchant Die and Mold Co., Glendale, Calif.

14c-24. 80-Inch Die Casting Die Produces Zinc Alloy Automobile Strip. *Steel,* v. 122, April 5, 1948, p. 84.

Alloy steel die used by Gerity-Michigan Corp., Detroit.

14c-25. The Successful Melting of Copper Based Alloys. *Canadian Metals & Metallurgical Industries,* v. 11, March 1948, p. 18-19. Condensed from *Foundry Practice,* No. 88 (a British publication).

14c-26. Lengthening a Gun-Metal Spindle. G. E. Morse. *Foundry Trade Journal,* v. 84, March 18, 1948, p. 279.

Method of casting an extra length onto a machined gun-metal spindle in the vertical position.

14c-27. Pressure-Cast Zinc Alloy Gears. *Machinery Lloyd* (Overseas Edition), v. 20, March 27, 1948, p. 79-80.

14c-28. Synthetic Resin Binders; Nonferrous Foundry Applications. H. C. Frisbie. *Metal Industry,* v. 72, April 2, 1948, p. 273.

Previously abstracted from *American Foundryman,* v. 13, Feb. 1948, p. 37-39. See item 4a-38, R.M.L., 1948.

14c-29. Influence des Conditions de Solidification sur la Texture et la Répartition des Constituants dans les Ebauches de Fonderie. (Influence of Conditions of Solidification on Structure and Distribution of Constituents in Semifinished Castings.) Jean Herenguel. *Fonderie,* Dec. 1947, p. 980-981; discussion, p. 981.

Structure, segregation of inclusions, and cavities in nonferrous alloys were investigated under different conditions of solidification of test specimens.

14c-30. Nonferrous Founding. R. W. Eade. *Metal Industry,* v. 72, April 9, 1948, p. 283-285.

A plant description.

14c-31. Solidification Mechanism of Tin Bronzes. (Concluded) Clyde L. Frear. *Foundry,* v. 76, May 1948, p. 130-132, 348, 350-351.

Important considerations in the production of tin-bronze castings.

14c-32. Effect of Foundry Practice on Properties of Some Binary Copper-Silicon Alloys. I. Krynitsky, W. P. Saunders, and H. Stern. *American Foundrymen's Association, Preprint No.* 48-27, 1948, 12 pages.

Tensile properties of four different types of Cu-Si alloy bars containing 2.0 to 4.9% Si. Tensile strength increases with an increase in silicon content and a decrease in pouring temperature. An increase in the amount of precipitated constituents seems to be associated with an increase in tensile strength and a decrease in elongation. Effects of different atmospheres on physical properties of 4.9% Si alloy castings. The chief cause of unsoundness as determined by hydraulic pressure tests was the presence of interconnected shrinkage cavities caused by inadequate feeding. 16 ref.

14c-33. The Roosevelt Memorial; An Outstanding Example of British Art Bronze Founding. A. L. Parrott. *Metal Industry,* v. 72, April 16, 1948, p. 304-309.

Steps in the casting of a large statue of the late Franklin Delano Roosevelt, which was recently dedicated in London.

14c-34. Solution for a Knotty Problem. *Die Castings,* v. 6, May 1948, p. 38-40, 46-47.

Die with knockout core was chosen in preference to a heavily machined sand casting for complicated part on mechanism for knitting machine.

14c-35. Effect of Injection Velocity on the Thermal Balance of Die Casting Dies. H. K. Barton. *Machinery* (London), v. 72, April 29, 1948, p. 544-548.

Theoretical calculations and curves of injection pressure vs. injection velocity for six common die-casting alloys.

14c-36. Rapid Die Casting Operation. Albert Greaves. *Modern Metals,* v. 4, May 1948, p. 17-19.

Equipment and procedures.

14c-37. Ingot Metal vs. Virgin Metal. Fred L. Wolf. *American Foundryman,* v. 13, May 1948, p. 94-96.

Commercial-scale tests using three types of furnaces to determine the relative advantages and disadvantages of use of each raw material in the brass foundry. Ingot metal was found to have many advantages. (Presented at 52nd Annual Meeting, A.F.A., Philadelphia, May 3-7, 1948.)

14c-38. Die Casting — An Important Factor in the Production of Hoover Vacuum Cleaners. R. J. Reel. *Modern Industrial Press,* v. 10, May 1948, p. 6, 8, 42, 54-55.

14c-39. Casting Lead Parts in Permanent Molds. Herbert Chase. *Iron Age,* v. 161, May 20, 1948, p. 90-91.

Permanent molds, the semi-automatic casting machines, and the techniques used for production of battery castings weighing up to 23 lb. Sb-Pb alloys used for different parts.

14c-40. Foundry Control Test for Melting High-Zinc Bronzes and Brasses. Joseph A. Duma. *Journal of the American Society of Naval Engineers,* v. 60, May 1948, p. 163-168.

Test which consists of a correlation between specific gravity and tensile strength and elongation. Tables of results of such control tests on manganese, bronze, Naval brass, and commercial brass.

14c-41. Die-Casting Dies; Testing to Determine Production Ability. W. M. Halliday. *Metal Industry,* v. 72, May 1948, p. 398-399, 407; May 21, 1948, p. 419-422.

Recommended procedure.

14c-42. Nickel-Silver Castings; An Investigation on the Effects of Gas Porosity. T. F. Pearson, W. A. Baker, and F. C. Child. *Metal Industry,* v. 72, June 11, 1948, p. 483-486; June 18, 1948, p. 506-507.

Work on a 60%-Cu, 20%-Ni, 20%-Zn alloy in which both high-frequency furnace and crucible melting were used. Shrinkage effects and effects of carbon, oxygen, sulphur, water vapor, and hydrogen.

14c-43. The Importance of Cores in Die-Casting Design. C. R. Maxon. *Mechanical Engineering,* v. 70, July 1948, p. 609-613.

Practical considerations involved in the design of cores.

14c-44. High-Duty Bronzes; The Slough Works of Langley Alloys Ltd. *Metal Industry,* v. 72, June 25, 1948, p. 517-520.

Production of the above and also of nickel-base alloy castings at British plant.

14c-45. The Effect of Casting Conditions on the Uniformity and Quality of Phosphor-Bronze Billets for Extrusion. J. C. Prytherch. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B1-B13.

Experimental procedure to determine best melting and casting procedure for small billets.

14c-46. Die-Casting Dies; Special Tools and Appliances for Proving New Dies. W. M. Halliday. *Metal Industry,* v. 73, July 16, 1948, p. 43-47.

A number of fixtures for facilitating the toolmaking, setting, mounting, and die-handling operations which arise during the testing of new die-casting dies.

14c-47. Permanent Mold Casting of Copper Base Alloys. James L. Erickson. *Iron Age,* v. 162, July 22, 1948, p. 84-89.

A comprehensive review of current British practice with particular emphasis on mold material and mold coatings. Composition and physical properties of the more commonly used alloys, as well as melting and casting techniques.

14c-48. An Efficient Layout for Bronze Melting. Bruce Schafer. *Foundry,* v. 76, Aug. 1948, p. 212-213, 216, 218.

Two examples.

14c-49. Gas Porosity in Nickel-Silver Castings. T. F. Pearson, W. A. Baker, and F. C. Child. *Foundry Trade Journal,* v. 85, Aug. 12, 1948, p. 145-151; discussion, p. 151-152.

Previously abstracted from *Metal Industry,* v. 72, June 11, 1948, p. 483-486; June 18, 1948, p. 506-507. See item 14c-42, 1948.

14c-50. Continuous Casting—the Asarco Process. J. S. Smart, Jr., and A. A. Smith, Jr. *Iron Age,* v. 162, Aug. 26, 1948, p. 72-80.

First extensive description of Asarco units. Work done on the Asarco process by American Smelting & Refining Co. in the production of copper and copper-base alloys.

14c-51. High Quality Pressure Die Castings. James L. Erickson. *Metallurgia,* v. 38, Aug. 1948, p. 212-214.

One of the difficulties in the production of heat treated Al-alloy die-castings is the blistering which occurs on heating to solution-treatment temperatures, as a result of the die-cavity air being trapped in the casting. Various points raised are believed of value in connection with the production of die castings from other alloys.

14c-52. Asbestos Additions Improve Nonferrous Foundry Sands. J. W. Horner, Jr. *American Foundryman,* v. 14, Sept. 1948, p. 59-62.

Use of 10% by volume of asbestos was first tried on an experimental basis for molding a bronze cylinder casting which had caused much trouble on account of various defects. Use of asbestos remedied the difficulties.

14c-53. Combining Lost-Wax and Centrifugal-Investment Casting. *Western Metals,* v. 6, Sept. 1948, p. 28-29.

New method for production-casting metallic articles. It has been used with particular success in manufacturing large numbers of small articles from nonferrous alloys.

14c-54. Les procédés de coulée semicontinue et continue des métaux non ferreux et leurs conséquences métallurgiques. (Methods for Semicontinuous Casting of Nonferrous Metals and Their Metallurgical Consequences.) J. Hérenguel. *Revue de Métallurgie,* v. 45, May-June 1948, p. 139-146.

Results of a thorough study of the methods. The rapid cooling taking place in all of them results in a series of metallurgical phenomena influencing the quality of the finished products. Remedies for unfavorable consequences.

14c-55. The Importance of Cores in Die Casting Design. Part 2. C. R. Maxon. *Die Castings,* v. 6, Oct. 1948, p. 36-38, 69-72.

Previously abstracted from *Mechanical Engineering,* v. 70, July 1948, p. 609-613.

14c-56. Pulverized Vermiculite Has Foundry Applications. Tony Willcox. *Foundry,* v. 76, Oct. 1948, p. 116.

Use as a general inhibitor, core wash, and refractory facing for permanent molds in the nonferrous foundry.

14c-57. Flexible Molds for Low-Melt Alloys. Thomas A. Dickinson. *Foundry,* v. 76, Oct. 1948, p. 218-220, 222, 224.

Various flexible-mold materials; the alloys which can be cast in flexible molds, and applications and procedures.

14c-58. Continuous Casting; Application of the Asarco Process to Copper-Base Alloys. J. S. Smart, Jr., and A. A. Smith, Jr. *Metal Industry,* v. 73, Oct. 29, 1948, p. 347-349; Nov. 5, 1948, p. 372-373. A condensation.

Previously abstracted from *Iron Age,* v. 162, Aug. 26, 1948, p. 72-80. See item 14c-50, 1948.

14c-59. Using Non-Ferrous Melting Stock to Best Advantage Hiram Brown. *American Foundryman,* v. 14, Nov. 1948, p. 63-65.

Recommendations for most efficient use of raw material, such as gating design; scrap segregation; saving of dross, skimmings, or grindings; selection of metal for purchase; handling melting stock; standardization of specifications.

14c-60. Close Control Required in Casting High-Conductivity Copper Alloys. Paul G. Maganus. *Materials & Methods,* v. 28, Nov. 1948, p. 69-71.

Methods and equipment used by Warren Foundry Div., Progressive Welder Co.

14c-61. Centrifugal Casting of Copper-Tin Alloys. *Machinery* (London), v. 73, Nov. 4, 1948, p. 645. Based on B.I.O.S. Report No. 1797.

German method.

14c-62. La fusione sotto pressione. (Die Casting.) Domenico Piva. *La Metallurgia Italiana,* v. 40, July-Aug. 1948, p. 142-148.

Different types of machines and their characteristics. Metals and alloys most convenient for this process are enumerated. Possible rates of production and obtainable tolerances.

14c-63. Shop Shots in New National Bearing Non-Ferrous Foundry. *Machinery,* v. 55, Dec. 1948, p. 180-181.

Includes machine-shop photographs.

14c-64. New Nonferrous Foundry Opened by American Brake Shoe Co. *Steel,* v. 123, Dec. 6, 1948, p. 120, 167.

14c-65. La fusion et le moulage des métaux précieux et de leurs alliages. La fusion sous vide et le moulage en cire perdue. (The Melting and Casting of Precious Metals and Their Alloys. Vacuum Melting and Casting by the Lost-Wax Process.) Edwin Rhodes. *Fonderie,* v. 32, Aug. 1948, p. 1271-1282.

Physical properties and applications of the different commonly encountered precious metals and alloys, and applications of the lost-wax process. 14 ref.

14c-66. The Importance of Cores in Die Casting Design. C. R. Maxon. *Die Castings,* v. 6, Sept. 1948, p. 30-32, 62-65.

Previously abstracted from *Mechanical Engineering,* v. 70, July 1948, p. 609-613. (To be cont.) See item 14c-43, 1948.

14c-67. Die Casting in Sweden—1914-48. H. K. Barton. *Machinery* (London), v. 73, Nov. 25, 1948, p. 743-746.

Equipment and typical die-cast articles.

14c-68. Degassing Nonferrous Metals. E. Kurzinski. *Foundry,* v. 76, Dec. 1948, p. 72-73, 142, 145, 148, 152, 154.

Various sources of gas porosity and the different ways to eliminate it. Primarily concerned with the elimination and prevention of only that porosity which is due to the presence of dissolved gases, and with improvement in the soundness and cleanliness of cast metal through the removal of oxides and other inclusions. Advantages and applications of flushing with inert gas. (To be concluded.)

14c-69. Precision Dies Mass-Produce Die-Castings. Harold E. Nagle. *American Machinist,* v. 92, Dec. 16, 1948, p. 77-81.

Inserted dies in multiple cavities and movable-side cores make possible zinc die-castings for internal lock parts that require little machining.

14c-70. Control of Bronze Melts for the Production of Pressure-Tight Castings. W. A. Baker. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. A130-A133; discussion, p. A133-A135.

Appeared as advance copy No. 880. Previously abstracted from *Foundry Trade Journal,* v. 82, July 10, 1947, p. 229-233. See item 14-221, 1947.

14c-71. The Precision Casting of High-Melting Point Alloys Containing Nickel. H. Evans, P. S. Cotton, and J. Thexton. 10 pages. 1947, Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England. (Advance copy No. 881.)

Previously abstracted from *Foundry Trade Journal,* v. 82, July 3, 1947, p. 205-210; July 10, 1947, p. 223-277. (Presented at 44th Annual Meeting, The Institute, Nottingham, England, June 17-20, 1947.) See item 14-218, 1947.

14d—Light Metals

14d-1. Melting Aluminum. *Metal Industry,* v. 71, Nov. 21, 1947, p. 425-426.
Use of a low-frequency, induction, channel-type furnace.

14d-2. Casting Light Metals. W. Roth. *Metal Industry,* v. 71, Nov. 28, 1947, p. 443-446.
Fundamental advantages of the continuous process.

14d-3. Aluminum. Walter E. Sicha. *Foundry,* v. 76, Jan. 1948, p. 70-73, 124, 126.
Important casting developments since the end of the war.

14d-4. Aluminum Alloy Castings. (Continued.) Floyd A. Lewis. *Foundry,* v. 76, Jan. 1948, p. 94-98, 171-172, 174-175, 178.
Properties and casting applications of the principal aluminum alloys.

14d-5. Squirrel Cage Motor Rotors Die Cast With High Economy. Robert J. Reel. *Electrical Manufacturing,* v. 41, Jan. 1948, p. 96-100.
Production of over 250 rotors per hr. by casting nearly pure aluminum in dual cavities in nitrided dies.

14d-6. Il Disegno dei Getti di Alluminio: Norme per il Progettista. (The Design of Aluminum Molds: Rules for the Planner.) *Alluminio,* Sept-Oct. 1947, p. NdO99-NdO118.
The various shapes and materials for molds for aluminum casting, with emphasis on improved quality. 12 ref.

14d-7. Automatic Gravity Casting. *Metal Industry,* v. 71, Dec. 26, 1947, p. 520-521. Based on paper by M. Bouret presented at 21st Congress of the Association Technique de Fonderie, Paris.
A French development for aluminum alloys.

14d-8. Die Casting Magnesium. *Metal Industry,* v. 71, Dec. 26, 1947, p. 529. Based on recent B.I.O.S. report.
Production methods used by a certain German plant.

14d-9. Grain Size; Control in Magnesium Casting Alloys. V. C. F. Holm and A. I. Krynitsky. *Metal Industry,* v. 72, Jan. 23, 1948, p. 67-68. Condensed from *Journal of Research of the National Bureau of Standards.*
Previously abstracted from *Foundry,* v. 75, Oct. 1947, p. 81, 228, 230, 232, 234, 236, 238, 240. See item 14-296, R.M.L., v. 4, 1947.

14d-10. Die Casting Aluminum Rotors on a Vertical Hydraulic Press. *Machinery,* v. 54, Feb. 1948, p. 150-152.
Methods and equipment used at Westinghouse Electric Corp.

14d-11. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, Feb. 1948, p. 90-93, 154, 156.
Recommended practices in the production of sand molds and cores for aluminum castings.

14d-12. Equilibrium Relations in Aluminum-Sodium Alloys of High Purity. W. L. Fink, L. A. Willey and H. C. Stumpf. *Metals Technology,* v. 15, Feb. 1948, T.P. 2339, 8 pages.
Results of precision measurements. 10 ref.

14d-13. Etat Actuel de nos Connaissances sur les Aciers Convenant a la Confection des Coquilles pour Coulée des Alliages d'Aluminium. (Present State of Knowledge of Steels Suitable for Manufacture of Molds for Aluminum Alloy Casting.) Marcel Bardot. *Fonderie,* Oct. 1947, p. 827-842.
A bibliographic report. 14 ref.

14d-14. Some Causes of Pinholes in Magnesium Alloy Castings. H. H. Fairfield and A. E. Murton. *American Foundrymen's Assoc., Preprint* No. 47-44, 1947, 10 pages.
Different types of sand, metal, and pouring methods were used in these experiments. A flat plate was chosen as a test casting, because the pinhole defect is said to be most prevalent on large flat surfaces. About 700 castings were made. The plates were radiographed and the number of circular defects determined.

14d-15. Solidification Rates of Aluminum in Dry Sand Molds. H. Y. Hunsicker. *American Foundrymen's Assoc., Preprint* No. 47-55, 1947, p. 16-22.
Discusses test results in an attempt to correlate data obtained on metal solidification rates by experimental methods in the foundry with similar data determined by a less expensive electrical method.

14d-16. Recent Improvements in Magnesium Alloy Founding. J. W. Meier and H. Livingstone. *Canadian Mining and Metallurgical Bulletin,* v. 41, Feb. 1948, p. 69-75; discussion, p. 75-77.

14d-17. Continuous Casting; German Plant and Practice. *Metal Industry,* v. 72, Feb. 6, 1948, p. 109-110.
Practically the entire German output of light alloys for extrusion was produced by the continuous-casting process. Machines and methods used by the various plants as well as an ingenious method of billet separation using a layer of molten salt.

14d-18. Die Casting Magnesium. Herbert Chase. *Iron Age,* v. 161, Feb. 26, 1948, p. 68-72.
Operations in the production of a large variety of magnesium die cast-

ings. Notes on injection techniques and die design.

14d-19. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, March 1948, p. 90-93, 232, 234, 236.

Melting operations are discussed in fourth of a series. (Based on a survey sponsored by the Foundry Division of the Aluminum Assoc.)

14d-20. Canada's Largest Aluminum Alloy Foundry Is 100% Mechanized. *Canadian Metals & Metallurgical Industries,* v. 11, Feb. 1948, p. 14-17, 40-41.

Etobicoke Works of Aluminum Co. of Canada, which was built during the war.

14d-21. Melting Aluminum. *Metal Industry,* v. 72, Feb. 20, 1948, p. 147-150. Condensed from recent B.I.O.S. report.

German plant and practice in all-electric foundries.

14d-22. Aluminum Alloy Castings. Floyd A. Lewis. *Materials & Methods,* v. 27, March 1948, p. 89-104.

The various alloys, advantages and disadvantages of the different casting methods and design limitations; finishing, testing, inspection, and processing. 10 ref.

14d-23. 1000-Ton Die-Casting Machine. *Iron Age,* v. 161, March 25, 1948, p. 78-79.

A cold-chamber, all-hydraulic, die-casting machine for Al castings up to 15 lb. in weight. The unit is rated at 1000 tons clamping pressure, has a total injection pressure of 160,000 lb. and features an automatic feeding system in which a tilting crucible furnace pours a metered amount of aluminum for introduction into the injection chamber.

14d-24. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, April 1948, p. 82-85, 196-197.

5th of a series describes fluxing, grain-refining practices, and pouring procedures in the aluminum foundry.

14d-25. Aluminum Casting Weighs 2350 Lb. *Foundry,* v. 76, April 1948, p. 120.

Production of a part for a wood-veneer slicing machine.

14d-26. Die Casting Progress. Part III —Aluminum Alloy Die Casting. A. C. Street. *Metallurgia,* v. 37, Feb. 1948, p. 201-204.

Developments in the production of aluminum die castings both gravity and pressure die cast.

14d-27. "Pressure Mold" Aluminum Die Castings. Paul R. Jordan. *Machinery* (London), v. 72, March 25, 1948, p. 407-410. Based on "High Pressure Die Casting", H. L. Harvill and Paul R. Jordan. 130 pages. Harvill Mfg. Co., Vernon, Calif.

Work in production of satisfactory Al die castings for the stressed members of aircraft structures. It was necessary to "sell" the Army Air Forces on a revision of specifications, since the existing specification resulted in poor-quality parts, which in turn caused die castings to be entirely banned. Proper design to avoid porosity or shrinkage.

14d-28. Light Alloy Founding. E. Raybould. *Metal Industry,* v. 72, April 2, 1948, p. 263-266.

Operations of the Slough factory of High Duty Alloys Ltd., in Britain.

14d-29. Machine Automatique Pour la Coulée en Coquille d'Alliage d'Aluminium. Perfectionnement au Demoulage des Noyaux Pour le Moulage en Coquille. (Automatic Machine for Chill Casting of Aluminum Alloys. Improved Method for Stripping the Core in Chill Casting.) Rene Bourret. *Fonderie,* Dec. 1947, p. 982-983; discussion, p. 983-984.

Machine is described, as well as the proposed method of core stripping. Advantages.

14d-30. Pilot Aluminum Foundry for New Product Development. J. T. Underwood. *Modern Metals,* v. 4, April 1948, p. 17-21.

14d-31. A Foundry Problem. *Metal Industry,* v. 72, April 9, 1948, p. 293.

An example of an Al alloy in which difficulty from entrapped gas from the core was experienced and method developed for elimination of the difficulty.

14d-32. Effect of Gating Design on Metal Flow Conditions in the Casting of Magnesium Alloys. H. E. Elliott and J. G. Mezoff. *American Foundrymen's Association, Preprint No.* 48-6, 22 pages.

Design of the gating system is correlated with degree of turbulence which occurs during the pouring of Mg-alloy castings, and with casting quality. Improper sprue design may lead to casting defects by entrainment of gases in the metal stream. Further work indicated that three casting defects may be caused or exaggerated by gating turbulence; namely, skins, blows, and microporosity. The value of skim-gates as a method of controlling gating turbulence.

14d-33. Studies on the Solidification of Aluminum Castings. Victor Paschkis. *American Foundrymen's Association. Preprint No.* 48-17, 1948, p. 4-9.

Previous reports covered a comparison between bleeding tests and

tests by the electric-analogy method on the solidification of steel and of white cast iron. The present report deals with a similar comparison for the solidification of pure aluminum.

14d-34. Structurally Sound Cast Parts Provided by Aluminum Base Alloy Pressure Molding. James L. Erickson. *Steel,* v. 122, May 3, 1948, p. 98-100.

Process, an outgrowth of the die-casting process, which minimizes trapped-air porosity, heterogeneous macro and microstructure, cold shuts, and oxide inclusions by avoiding turbulence during the casting process.

14d-35. Pressure Molding Aluminum-Base Alloy Castings. J. L. Erickson. *Metal Industry.* v. 72, May 7, 1948, p. 385-387.

Abstracted from *Steel,* v. 122, May 3, 1948, p. 98-100. See item 14d-34, 1948.

14d-36. Moderna Tecnica della Colata in Conchiglia delle Leghe di Aluminio e di Magnesio. (Modern Technique for Chill Casting of Aluminum-Magnesium Alloys.) B. Guastalla. *Alluminio,* v. 17, Jan.-Feb. 1948, p. 7-33.

Various methods used and several improvements in mold manufacture in order to minimize defects in the castings. 66 ref.

14d-37. Die-Casting Progress; Part 4. Pressure Die-Casting of Magnesium Alloys. A. C. Street. *Metallurgia,* v. 38, May 1948, p. 3-5.

Recent developments.

14d-38. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 26, June 1948, p. 96-97, 262, 264, 266, 268, 270.

Considerations in the design of aluminum-alloy castings. Seventh of a series of articles based on a survey sponsored by the Aluminum Association's Foundry Division.

14d-39. Pressure Casting Aluminum Matchplates in Plaster Molds. Stanley N. Touchman. *Foundry,* v. 76, July 1948, p. 76-79, 194, 196, 198

Recommended procedures.

14d-40. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, July 1948, p. 92-95, 140.

Permanent mold casting of aluminum alloys.

14d-41. Grain Size Control in Magnesium Casting Alloys. *Industrial Heating,* v. 15, July 1948, p. 1140, 1158. Based on paper by Vernon C. F. Holm and Alexander I. Krynitsky.

Previously abstracted from *Foundry,* v. 75, Oct. 1947, p. 81, 228, 230, 232, 234, 236, 238, 240. See item 14-296, 1947.

14d-42. Modern Practices in Sand Casting of Magnesium Alloys. T. R. B. Watson. *Canadian Metals & Metallurgical Industries,* v. 11, July 1948, p. 16-19, 41.

Also deals briefly with production of magnesium, properties, corrosion resistance, alloys, heat treatment, and chrome pickling.

14d-43. Aluminium Alloy Casting Developments. E. G. West. *Foundry Trade Journal,* v. 84, June 24, 1948, p. 607-612; v. 85, July 1, 1948, p. 7-12.

Stages in the development of the aluminum-base casting alloys in use today. Various improvements which have taken place in the processes and techniques involved in their manufacture. Applications and new outlets being explored. 12 ref.

14d-44. Un tour d 'horizon sur les fonderies Francaises d 'alliages légers. Premiere Partie. L'equipement des fonderies. (A Survey of French Light-Alloy Foundries. Part One. Foundry Equipment.) Charles Roinet. *Revue de L'Aluminium,* v. 25, June 1948, p. 187-195.

Also describes melting techniques.

14d-45. Recommended Practices for Sand Casting Aluminum and Magnesium Alloys. *American Foundrymen's Association,* 1948, 55 pages.

Recommended practices covering a wide range of aluminum-base alloys both of the heat treated and the nonheat treated types; general recommendations for founding aluminum-base alloys pertaining to molding practice, including sands used, facings, gating and risering, core practice, melting and pouring, finishing, heat treatment, and causes and remedies for defects. Chemical control limits, physical properties, conforming specifications, developments, and fields of use for each group of alloys. Each alloy is identified by an A.S.T.M. number which is immediately followed by parentheses enclosing the common or trade number of the alloy which is most familiar to foundrymen.

14d-46. The Casting of Marine Bronze Propellers. (Concluded.) F. J. Tector, and J. Martland. *Foundry Trade Journal,* v. 85, July 29, 1948, p. 99-100; discussion, p. 100-104.

The sand plant and sand handling, and production results.

14d-47. Casting Aluminum Pistons in Permanent Molds. Robert H. Herrmann. *Foundry,* v. 6, Sept. 1948, p. 78-83, 130, 132.

Production methods at Thompson Products Inc., Tapco plant, Cleveland.

14d-48. Un tour d'horizon sur les fonderies francaises d'alliages legers. II. La technique du moulage. (A Survey of French Light-Alloy Foundries. II. The Technique of Casting.) Charles Roinet. *Revue l'Aluminium,* v. 25, July-Aug. 1948, p. 223-227.

To be continued.

14d-49. Precision Casting—A Production Achievement! Chester S. Ricker. *Tool Engineer,* v. 21, Sept. 1948, p. 27-29.

Production of Buick "Dynaflow" torque-converter drive units from Al alloy by the Antioch process.

14d-50. Machine automatique pour la coulée en coquille de pieces en alliages d'aluminium. (Automatic Machine for Chill Casting of Aluminum-Alloy Parts.) René Bourret. *Fonderie,* June 1948, p. 1198-1200.

Casting machine operated by compressed air which is claimed to be superior in simplicity and ease of operation to other types.

14d-51. Aluminium-Alloy Casting Developments. E. G. West. *Engineering,* v. 166, Aug. 27, 1948, p. 213-216. A condensation.

14d-52. Die Casting Aluminum and Magnesium Alloys Part 1. *Modern Metals,* v. 4, Sept. 1948, p. 16-20.

Based on recent book published by Aluminum Company of America. Where to use die castings, advantages, die-casting machines, casting designs, and processes governing die-making practice.

14d-53. Un tour d'horizon sur les fonderies Francaises d'alliages légers. Troisieme partie. Etudes de moulages. (Survey of French Light-Alloy Foundries. Part Three. Casting Studies.) Charles Roinet. *Revue de l'Aluminium,* v. 25, Sept. 1948, p. 262-268.

The casting of complicated machine parts from light alloys. Each individual casting is illustrated by schematic drawings, indicating construction of molds and progressive stages of casting.

14d-54. Pressure Die-Casting for Greater Production Rates with Aluminium Alloys. E. Carrington. *Metal Industry,* v. 73, Sept. 17, 1948, p. 228-230; Sept. 24, 1948, p. 250-252; Oct. 1, 1948, p. 267-269.

Details of process.

14d-55. Die Castings Reduce Processing Cost. *Production Engineering & Management,* v. 22, Oct. 1948, p. 58.

One of the ten large die-casting machines used in production of 5-lb. Al castings for Hoover vacuum cleaners.

14d-56. Aluminum Alloy Pressure Molding—Prodigy of Die Casting. James L. Erickson. *Light Metal Age,* v. 6, Oct. 1948, p. 14-17, 29, 33.

Superior mechanical properties in comparison with other types of Al-alloy castings, or even forgings. Why this superiority exists and comparative data for mechanical, physical, and electrical properties of the various types. Gray irons, malleable irons, Mg alloys, Zn-base castings, and Cu-base castings.

14d-57. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, Nov. 1948, p. 88-89, 188-190, 192, 194.

Common defects encountered in aluminum alloy castings and methods of correcting them. Twelfth and concluding article of a series based on a survey sponsored by the Foundry Division of the Aluminum Association.

14d-58. Light Alloy Centrifugal Castings. David Basch. *Canadian Metals & Metallurgical Industries,* v. 11, Nov. 1948, p. 23, 32.

Research at the Canadian Bureau of Mines, Ottawa, sponsored by A.F.S. Test castings are 13-in. diam. wheels with spokes of varying thickness. Mechanical properties of test bars cut from these spokes.

14d-59. Dynaflow Rotors Cast in Plaster Molds. Chester Ricker. *American Machinist,* v. 92, Nov. 18, 1948, p. 120-123.

How the Antioch process, not to be confused with lost wax, provides a means of making intricate aluminum castings with smooth surfaces held to close tolerances.

14d-60. Un tour d'horizon sur les fonderies Francaises d'alliages-legers. IV. Les defauts de fonderie. (Survey of French Light-Alloy Foundries. IV. Casting Defects.) (Concluded.) Charles Roinet. *Revue de l'Aluminium,* v. 25, Oct. 1948, p. 311-318.

The most important defects occurring during commercial casting of light alloys. Causes and prevention of such defects.

14d-61. Impregnation of Aluminum and Magnesium Castings. E. V. Blackmun. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 146-152; discussion, p. 152.

Appeared as preprint 47-28. Previously abstracted from *American Foundryman,* v. 12, Nov. 1947, p. 49-55; discussion p. 55. See item 14-344, 1947.

14d-62. A New Gating Technique for Magnesium Alloy Castings. H. E. Elli-

ott and J. G. Mezoff. *Transactions of the American Foundrymen's Association;* v. 55, 1947, p. 241-250; discussion, p. 250-251.

Appeared as preprint 47-36, 1947. Previously abstracted from *American Foundryman,* v. 11, May 1947, p. 71-79. See item 14-150, 1947.

14d-63. Some Causes of Pinholes in Magnesium Alloy Castings. H. H. Fairfield and A. E. Murton. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 633-642; discussion, p. 642-644.

Previously abstracted from preprint. See item 14d-14, 1948.

SECTION XV

SCRAP AND BYPRODUCT UTILIZATION

15a—General

15a-1. Treating Plating Room Wastes From Die Casting. Finishing Operations. *Die Castings,* v. 6, Jan. 1948, p. 59-60, 62, 72. Condensed from paper by George E. Barnes.

The fundamental features of a multi-purpose treatment works for complete handling of all plating wastes arising from finishing operations required in the manufacture of zippers. (Presented at 3rd Industrial Waste Conference, Purdue University, Lafayette, Ind., May 22, 1947.)

15a-2. The Treatment of Plating and Pickling Shop Wastes. E. W. Mulcahy. *Journal of the Eletcrodepositors' Technical Society,* v. 22, 1947, p. 227-242. (Preprint).

Methods of neutralizing acid from waste liquors and rinse water; the precipitation of chromium, copper, iron, etc.; the removal of cyanide in effluents; the construction of effluent treatment tanks of suitable acidproof materials; the measurement of flow and pH recording apparatus; the removal and scrubbing of nitrous oxide fumes from bright dipping plants; figures for intake air velocity on extractors; hard rubber as a protective lining for tanks and fan casings; study of the recovery of waste pickle liquors from industrial pickling plants; a plant for the crystallization of ferrous sulphate.

15a-3. Scrap Metals. Charles White Merrill, Herbert L. Cullen, and Norwood B. Melcher. *Mining Congress Journal,* v. 34, Feb. 1948, p. 119-121.

Economic trends.

15a-4. Efficient Methods Employed in Scrap Reclamation. *Modern Industrial Press,* v. 10, March 1948, p. 38, 40, 51.

Methods and equipment used in scrap handling and salvage by Wilkoff Co., Youngstown, Ohio.

15a-5. The Disposal of Plating Room Wastes; Annual Report on A.E.S. Research Project No. 10. Barnett F. Dodge and Dinwiddie C. Reams. *Proceedings of the 34th Annual Convention, American Electroplaters' Society,* 1948, p. 249-269; discussion, p. 269.

A general review of the situation in regard to plating wastes and their disposal. After discussing the origin of the wastes and presenting some data on their volume and composition, the effects of some of the constituents of the most common wastes on aquatic life and on the operation of sewage disposal systems are briefly mentioned. Possible methods for treatment of the wastes with particular attention to chemical methods. Processes that have been tested either in pilot plants or full-scale installations. 27 ref.

15a-6. Some Suggestions for the Disposal of Ferrous Sulphate From Waste Pickle Liquor. Paul de Lattre. *Sheet Metal Industries,* v. 25, April 1948, p. 697-703, 716.

Direct uses and conversion to other salable products. Technical, mechanical, and economic problems. 24 ref.

15a-7. Salvaging Drilled Parts by Welding. *Machinery* (London), v. 72, May 20, 1948, p. 623.

Jig used with an electric welding machine to salvage dies or other drilled parts.

15a-8. Scrap, Properly Handled, Brings a Premium. C. W. Cederberg. *American Machinist,* v. 92, June 3, 1948, p. 98.

How it is done at Larson Tool & Stamping Co.

15a-9. We Sort Scrap to Get Top Prices. F. J. McLaughlin. *Factory Management and Maintenance,* v. 106, July 1948, p. 118-119.

15a-10. How Metallizing Solves Mine Maintenance Problems. Rick Mansell. *Engineering and Mining Journal,* v. 149, July 1948, p. 82-84.

Surface preparation and metal-

spraying in reconditioning worn equipment parts.

15a-11. Making Chip Salvage Pay an Extra Profit. *Factory Management and Maintenance,* v. 106, Aug. 1948, p. 74-75.

15a-12. Utilizing Nonferrous Scrap Conserves Metal Resources. Earl S. Schwartz. *American Foundryman,* v. 14, Aug. 1948, p. 38-40.

Problems encountered by the smelter and refiner of nonferrous scrap in melting and refining the various grades of secondary metals and producing alloys to strict chemical specifications.

15a-13. Segregation and Collection of Industrial Scrap. Marcus E. Borinstein. *Better Enameling,* v. 19, Aug. 1948, p. 9-11, 30.

Waste in handling; methods for reducing loss in scrap value.

15a-14. Maintenance Hub of the Main Line. Ralph G. Paul. *Western Machinery and Steel World,* v. 39, Sept. 1948, p. 86-89, 105.

Maintenance equipment and procedures include sheet-metal fabricating department, drop-hammer department, welding shop, heat treating department, and machine shop.

15a-15. Deplating With Voltage Control. J. B. Mohler. *Plating,* v. 35, Oct. 1948, p. 1013, 1044.

Selection of electrolytes for replating and typical curves of current density vs. tank voltage for anodes of different metals in different electrolytes. Shows that voltage and current density must be controlled during stripping of copper from steel in cyanide solution. Same principles apply to stripping Pb- or Sn-base alloys from steel using hot alkaline tartrate solutions.

15a-16. Metallurgical Treatment of Chips and Borings. Part I. Sources of Material, Drying, De-Oiling, Iron Removal and Briquetting. Part II. Briquetting, Baling Separation and Crucible Melting. Edmund R. Thews. *Canadian Metals & Metallurgical Industries,* v. 11, Oct. 1948, p. 23-24, 30, 32, 35; Nov. 1948, p. 24, 27-28, 30.

15a-17. La question du déchet dans l'industrie métallurgique de son influence sur le cout du produit manufacture. (The Problem of Waste in the Metal Industry; Influence on Cost of Finished Products.) (Also in German.) Etienne de Coulon, Philippe de Coulon, and O. H. C. Messner. *Pro-Metal,* v. 3, May 1948, p. 50-55.

Studied with particular emphasis on cost factors. Methods of evaluation of waste materials are indicated by a series of schematic diagrams.

15b—Ferrous

15b-1. Shattered Crankcase Salvaged by Welding. *Welding Engineer,* v. 33, Jan. 1948, p. 51.

Unusual repair made on a 2-ton casting for a 300-hp. engine which restored a dredger to service.

15b-2. Welding and Flame Cutting. C. W. Brett. *Chemical Age,* v. 57, Dec. 6, 1947, p. 732-734.

Use of rapid repairs to help maintain production in the chemical industry.

15b-3. Los Angeles Program Speeds Reconditioning of Cast Iron Pipe. R. E. Hemborg. *Engineering News-Record,* v. 140, Jan. 8, 1948, p. 92.

The pipe is hand scraped, grit-blasted, mortar lined, and then coated with a coal-tar paint.

15b-4. Absorption Studies With Waste Pickle Liquor. J. Seiberlich. *Steel,* v. 122, Jan. 12, 1948, p. 90, 92, 97-98.

Activated charcoal appears to be the best selective absorption for ferrous sulphate in neutral and acid solutions. A method which lends itself to the problem of waste pickle-liquor disposal in steel and allied industries.

15b-5. Steel Drum Reconditioning Speeded. *Iron Age,* v. 161, Jan. 22, 1948 p. 65.

Use of abrasive blasting.

15b-6. Maintenance With Stainless Electrodes. Joseph A. Cunningham. *Welding Engineer,* v. 33, Feb. 1948, p. 40-43.

Use of stainless steel electrodes in quarries, cement mills, railroads, steel mills, oil refineries, earth-moving, and other industries as a hard facing auxiliary.

15b-7. Reconstruction of a Steam Boiler. (In Russian) A. V. Makushin. *Avtogennoe Delo* (Welding), Oct. 1947, p. 22-23.

Welding repair procedures for a boiler damaged during the war.

15b-8. Simple Tools Repair Pedestal Cracks. A. R. Eastcott. *Power,* v. 92, March 1948, p. 83.

When a large steam turbine's bearing pedestal cracked in two places, welding or machine-shop repair was impracticable. Simple method devised by the plant mechanic.

15b-9. High Hardenability Steel Salvaged by Welding. H. J. Nichols.

American Foundryman, v. 13, March 1948, p. 46-47.

Method used for a 0.4% C steel containing 1.30 to 1.55% Mn, 0.35 to 0.60% Si, 0.45 to 0.60% Cr, and 0.35 to 0.45% Mo consisted of flame cutting the cracked material away, using the heat so generated as a preheat, and welding the cracked parts by the metallic-arc process.

15b-10. Welding Offers New Aid. C. W. Brett. *British Steelmaker,* v. 14, March 1948, p. 140-142.

Welding repair of large steelworks machinery.

15b-11. "Facing" a Problem Which Bites Deep Into Production Costs—The Oil Industry Solves It by Applying Hard Facing. *Weld,* v. 4, March 1948, p. 12-13.

Describes and illustrates use of "acetylene Borium" for hard facing of drill-string joints.

15b-12. Wards of the Coast Guard—With the Aid of Welding Torches These Big Buoys Are Kept in Condition. *Weld,* v. 4, March 1948, p. 7-9.

Repair procedures.

15b-13. Steel Chip Salvage Handled Mechanically at Salisbury. A. D. Connelly. *Industry and Power,* v. 54, April 1948, p. 95-96.

Equipment for the chip salvage at Salisbury Axle Works, Ft. Wayne, Ind.

15b-14. Cold Repair of Broken Castings. *Machinery* (London), v. 72, Feb. 19, 1948, p. 243-244.

Use of "Metalock" system which consists essentially of inserting a series of keys transversely across the fracture.

15b-15. Preparation and Charging of Scrap. Clyde Denlinger. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 53-55; discussion, p. 55-61.

Recommended procedures for the basic openhearth; a short preliminary to an extended discussion.

15b-16. Reconditioning of Used Rolling-Mill Rolls by Deposition of Metal Using Welding Techniques. (In Russian.) Yu. A. Kalachev. *Avtogennoe Delo* (Welding), Jan. 1948, p. 29-30.

15b-17. Soldering of a Cast-Iron Part Using Hard Solder. (In Russian.) N. P. Nikitin. *Avtogennoe Delo* (Welding), Jan. 1948, p. 31.

Composition of solder and method of application.

15b-18. Economies Resulting From Arc Welding. W. G. Ough. *Canadian Mining Journal,* v. 69, Jan. 1948, p. 60-63.

Use in repair and maintenance by a Mexican company, which treats gold and silver ores by the cyanidation process.

15b-19. Repairs to Farming Equipment; Applications of Oxy-Acetylene Welding. F. Clark and R. C. Hesketh Jones. *Welding,* v. 16, April 1948, p. 138-144.

15b-20. Major Operations on Oil Tankers; the Restoration of a Fore-End. J. K. Johannesen. *Welding,* v. 16, April 1948, p. 157-162.

Details of welding-repair operations. (To be concluded.)

15b-21. Sanitarium for Drums. *Industrial and Engineering Chemistry,* v. 40, May 1948, p. 20A, 22A.

Methods used in reconditioning of steel drums.

15b-22. Production Repair of Alloy Steel Castings. John W. Juppenlatz. *Industry and Welding,* v. 21, May 1948, p. 26-29, 49-50, 52.

A picture story with emphasis on welding.

15b-23. Scrap Critical National Resource. *Steel,* v. 122, May 3, 1948, p. 61-68.

A special report by the editors of *Steel* for iron and steel.

15b-24. Dam Gets a Face Lifting. Henry W. Young. *Welding Engineer,* v. 33, May 1948, p. 46-48, 51.

Concrete slabs were skin grafted to the worn-out face of Barker dam by lap welding steel dowels embedded in the slabs to steel anchor bars grouted into the face. Intervening space was then backfilled.

15b-25. Farm Equipment Remade. Ernest J. Koop. *Welding Engineer,* v. 33. May 1948, p. 54-55, 64.

Welding repairs.

15b-26. Unlocking Davy Jones' Locker. Clarence Judd. *Steelways,* May 1948, p. 10-12.

Steel-scrap salvage from the sea.

15b-27. New Show Goes on the Road. *Steelways,* May 1948, p. 30-31.

Metalworking procedures involved in modernization of steel railway coaches.

15b-28. Blowpipe Cutting Employed to Reclaim Ladle Skulls and Buttons. *Steel,* v. 122, May 17, 1948, p. 94, 97.

Application of gas-cutting installation for reclamation of heavy scrap long considered too costly to recover in charging box sizes. The oxygen lance is used on large skulls and the blowpipe on smaller sizes. Cutting speed varies from 2 to 6

in. per min. Cost of recovery is $4.50 a ton.

15b-29. Recommended Practices for Salvaging Automotive Gray Iron Castings by Welding; A Committee Report. *Welding Journal,* v. 27, May 1948, p. 351-358.

Published for the purpose of securing comments, criticisms, and suggestions.

15b-30. Le Relevement des Ponts et Leur Réparation par Soudure. (Restoration of Bridges and Their Repair by Welding.) A. Goelzer. *Soudure et Techniques Connexes,* v. 2, March-April 1948, p. 70-81, 84.

Methods used on bridges wrecked by bombing.

15b-31. Réparation d'un Arbre de Compresseur de 7000 m³/heure. (Repair of a Compressor Shaft of 7000 Cm. per Hr. Capacity.) G. Gronier. *Soudure et Techniques Connexes,* v. 2, March-April 1948, p. 82-84.

Repair by electric welding. Besides the shaft, the bearing and its support were also fractured.

15b-32. Some Aspects of Welding Repairs. J. K. Johannesen. *Transactions of the Institute of Welding,* v. 11, April 1948, p. 66-74.

Present trends in the application of welding to repairs. Applications of welding to modern mining practice, steam plant, marine and submarine spheres, variables in deposits and base materials, and electrode specialization.

15b-33. Welding Saves Costly Pump Casings. Carl Balow. *Power,* v. 92, June 1948, p. 74-77.

Shock from rapid load changes in 1600-psi. boiler feed pumps called for inner casing made of chromium steel, an alloy difficult to cast without flaws. Careful casting procedure and welding licked the leak problem.

15b-34. Reclaiming Large Iron Cast Parts. E. Barber. *Machinery Lloyd* (Overseas Edition), v. 20, May 22, 1948, p. 101-103.

Various methods, including welding, brazing, metal spraying, and by use of anchor studs. Examples of successful repairs.

15b-35. For More Efficient Production Check Your Maintenance Welding. This Is How It's Done at Caterpillar Tractor Co. A. A. Wald. *Industry and Welding,* v. 21, June 1948, p. 26-29, 46, 48, 50, 52.

15b-36. Scrapping Big Guns. *Welding Engineer,* v. 33, June 1948, p. 34-35.

Use of flame cutting on gun barrels with walls up to 18-in. thick.

15b-37. Repairing a Steam Turbine Cylinder. J. C. Blankenship. *Power Generation,* v. 52, May 1948, p. 68-69.

Use of cleaning, welding and steel pins.

15b-38. Rehabilitation of Pipe Lines in Place, 3" to 24", by the Pittsburgh-Erie Process. Alfred B. Anderson. *Corrosion and Material Protection,* v. 5, May-June 1948, p. 6-8.

An electrolytic method for depositing an especially prepared bitumen compound from an aqueous solution on the pipe interior. New sectional cleaning machine to clean pipe before coating.

15b-39. Duplexing Steel Operation Affords Greater Use of Stainless Scrap in Melt. Dan Reebel. *Steel,* v. 122, June 28, 1948, p. 90, 93, 108.

Combination of high-frequency and arc-furnace melting is used to absorb excessive amounts of tube-mill scrap stainless. Up to 60% Cr-Ni scrap may be utilized.

15b-40. Gold Dredge Kept Digging. H. B. McGuire. *Welding Engineer,* v. 33, July 1948, p. 48-50, 64-65.

Renewal of worn Mn-steel buckets weighing 2½ tons apiece by hard surfacing. Amounts of material used, costs of labor and materials, and techniques.

15b-41. Salvage Operations Simplified by Magnetic Analysis. Arthur D. Stout, Jr. *Iron Age,* v. 162, July 1, 1948, p. 86-87.

Use to simplify separation of mixed steel grades. Use in inspection work and in measuring hardness or machinability, as well as detection of surface and subsurface flaws.

15b-42. 8-Ton Casting Repaired by Welding Crack. Margaret Ralston. *Welding Engineer,* v. 33, Sept. 1948, p. 38-39.

Welding of cracked water jacket of diesel engine, having walls 2¼ to 6 in. thick. It was repaired by use of oxy-acetylene torches and cast-iron filler rods.

15b-43. Weld Repairs on Tubing Stress-Relieved With Water-Cooled Copper Induction Coils. E. K. Dewey. *Petroleum Processing,* v. 3, Sept. 1948, p. 845-846.

Method for the above.

15b-44. Future Scrap Sources for the Steel Plants. C. R. Holton. *Steel,* v. 123, Sept. 13, 1948, p. 128, 130, 132, 135, 138, 140, 142, 145-146.

Reviews lessons learned during World War II, the more important of which were more systematic methods of collection; careful segregation into grades; and facili-

ties for shearing, briquetting, bundling, cleaning, and degreasing.

15b-45. Repair of Welded Ships. L. F. Bledsoe. *Welding Journal,* v. 27, Sept. 1948, p. 690-694.

Problems encountered in the structural repair of welded ships often lead to structural failure. Recommended practice in design, sequence, workmanship, inspection, and post-weld treatment.

15b-46. You Can Make Rusted Fenders Good as New; Welding and Cutting Helps Complete a Tough Job. F. C. Geibig. *Welding Journal,* v. 27, Sept. 1948, p. 725-726.

15b-47. It's Easy to Weld Pulleys and Gears; This Article Tells You How to Use Your Blowpipe for Preheat. F. F. Mooney. *Welding Journal,* v. 27, Sept. 1948, p. 728.

15b-48. Bronze Welding or Fusion Welding for Repairing Cast Iron? H. B. Gilson. *Materials & Methods,* v. 28, Sept. 1948, p. 74-76.

Pros and cons of above methods. Proper choice of repair welding method depends upon type of cast iron, processing factors, and service conditions.

15b-49. Aqueous Caustic Soda De-Enameling. *Enamelist,* v. 25, Sept. 1948, p. 22-24.

Equipment and procedures.

15b-50. Reconditioning Worn Traction Motor Housings. Donald M. Laflin. *Railway Mechanical Engineer,* v. 122, Sept. 1948, p. 95-97, 100.

Procedures for machining the wear points on motor housings to their original dimensions after worn surfaces have been restored by means of welding.

15b-51. Submerged Arc Welding for Maintenance. C. C. Keyser. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 37-42; discussion, p. 42.

Miscellaneous applications in the steel mill.

15b-52. Back on the Job Because They Were Bronze-Welded. *Linde Tips,* v. 27, Oct. 1948, p. 84-85.

Typical bronze-welded repair jobs.

15b-53. High Frequency Heating Used for Turbine Shaft Repair. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 348. Condensed from *Commonwealth Engineer,* v. 35, March 1948, p. 325-326.

Use during welding repair job.

15b-54. Automatic Machine Bales Over 110 Tons of Scrap Daily. *Automotive Industries,* v. 99, Oct. 15, 1948, p. 44, 64.

15b-55. La soudure appliquée a la réparation des batis de presse. (Welding as Applied to the Repair of Stamping Presses). M. Grenez. *Soudure et Techniques connexes,* v. 2, July-Aug. 1948, p. 170-173.

Methods applied to 100, 250, and 600-ton presses.

15b-56. 16" Coastal Defense Guns Yield to Cutting Torch. *Victor Weld,* v. 4, Oct. 1948, p. 9-11.

Salvage procedures.

15b-57. For More Efficient Production Check Your Maintenance Welding; This is How It's Done at Chevrolet's Gear & Axle Plant. L. H. Feeney. *Industry and Welding,* v. 21, Nov. 1948, p. 30-33, 87.

15b-58. Repairing Locomotive Frames. R. G. Swisher. *Welding Engineer,* v. 33, Nov. 1948, p. 60.

Broken frames can be repaired with a minimum of dismantling by arc welding.

15b-59. Salvaging Fifty-six Tons of Sheet Metal Per Day. *Machinery,* v. 55, Nov. 1948, p. 178-183.

Enough material is being salvaged to make an extra car in every 50.

15b-60. First of IHC Nation-Wide Chain of Truck Unit Rebuilding Plants. *Automotive Industries,* v. 99, Nov. 1, 1948, p. 44-45.

Application of mass-production technique and assembly lines. Machining and inspection.

15b-61. Post-War Aristocrat: The Junkman. Edward B. Lockett. *Steelways,* Nov. 1948, p. 1-5.

The story of scrap iron and steel, from the junkman's wagon on one hand and the dismantling of battleships on the other, to the steel mills which convert this material into new steel once more.

15b-62. Steel Mill Wastes Converted From Nuisance to Profit. *Chemical Industries,* v. 63, Nov. 1948, p. 784-785.

How chemical company will process spent pickle liquor to produce zinc and iron salts and galvanizing wastes to produce zinc oxide at new plant being built.

15b-63. What Is the Best Way to Repair Cast Iron. K. H. Koopman. *Welding Journal,* v. 27, Nov. 1948, p. 951-954.

15c—Nonferrous

15c-1. Tri des Vieux Bronzes et Laitons en Vue de l'Elimination de Pieces Contenant de l'Aluminium. (Sorting of Old Bronzes and Brasses to Eliminate Those Containing Aluminum.) Georges Blanc. *Fonderie,* Nov. 1947, p. 893-894.

Samples are tested with a file and the soft ones discarded since they do not contain aluminum. Drilling will give similar information. The action of various solvents as a means of indicating the approximate percentages of aluminum in the alloys.

15c-2. Secondary Zinc-Base Alloys; Corrosion—Impurities—Production. D. P. Oakley. *Metal Industry,* v. 72, Feb. 6, 1948, p. 113.

The effect of intercrystalline corrosion caused by impurities, the precautions to be taken against such impurities in the manufacture of secondary Zn-base alloys, and working details and temperatures for their use in pressure die casting.

15c-3. Worn and Broken Zinc Die Castings Can Be Repaired by Welding. A. E. Speck. *Materials & Methods,* v. 27, March 1948, p. 72-74.

15c-4. Scrap Brass; Distillation of Zinc and Refining of Residual Copper. F. F. Roland. *Metal Industry,* v. 72, April 23, 1948, p. 331-332.

The recovery of copper from scrap brass by distilling off the zinc was described by the same author in the Nov. 29, 1946 issue. Subsequent developments are discussed in this article.

15c-5. Ueber die Verwendung von Umschmelzzink und Umschmelzzinklegierungen. (On the Use of Scrap Zinc and Scrap Zinc Alloys.) W. Wolf. *Metall,* Dec. 1947, p. 112-114.

Suitability of various types for different applications, as well as limitations.

15c-6. Zur Bergung und Verwertung von Altkupfer. (Salvage and Utilization of Scrap Copper.) H. Broking. *Metall,* Jan. 1948, p. 11-13.

Details of recommended methods for recovery of scrap copper, especially from the ruins of Europe, and its reuse. Flow diagram showing sorting into four types, processing steps for each, and use in combination with ore concentrates in the smelter.

15c-7. Nonferrous Gas-Fired Zinc Stills. *Industrial Gas,* v. 27, Nov. 1948, p. 15.

Used for secondary recovery.

15c-8. Reclamation of Zinc in Stills. *Industrial Heating,* v. 15, Nov. 1948, p. 1930, 1932.

Method and equipment.

15d—Light Metals

15d-1. Scrapped Scrappers. *Industrial and Engineering Chemistry,* v. 40, Jan. 1948, p. 16A, 22A, 24A.

Methods and equipment used to recover metal from junked or wrecked planes in Germany during the war. Usual practice was use of a sloping hearth to which mixed scrap was fed and on which the lighter metals melted and were thus separated from the high melting-point materials. In one installation the molten metal was first washed with 25% molten Mg, forming insoluble, intermetallic compounds of Al or Mg with Fe, Mn, Si, Mo, Ti, Zr, and Ce, which were filtered or settled out. The filtrate was treated under vacuum with hydrogen, which distilled out the Mg along with Zn, Cd, Pb, Ca, Bi, Ba, and Sb.

15d-2. Reclamation of Aluminum From Scrap. W. H. Dennis. *Mine & Quarry Engineering,* v. 14, Jan. 1948, p. 13-16.

Methods and equipment.

15d-3. Aluminum Purification; Methods of Removing Hydrogen and Insoluble Particles. *Metal Industry,* v. 72, Feb. 13, 1948, p. 133. Condensed from **Purification of Aluminum and its Alloys,** Yves Dardel, *Metals Technology,* v. 14, Sept. 1947, T. P. 2247.

Previously abstracted from original paper. See item 15-36, R.M.L., v. 4, 1947.

15d-4. Sorting of Aluminum Alloys by Means of the "Steeloscope". (In Russian.) N. S. Sventitskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1454-1459.

A method for scrap sorting or qualitative analysis using a form of visual spectroscopy. Lines and bands corresponding to different alloys are illustrated.

15d-5. Brush Anodic Films Onto Local Areas. E. Simon and F. W. Thomas. *American Machinist,* v. 92, July 1, 1948, p. 103-105.

"Brush Anodizing" process used for repair jobs on Ni, Al, and Mg, when conventional tank anodizing is impractical. Only a few seconds are required to produce a satisfactory anodic film.

15d-6. Neuzeitliche Leichtmetallschrott-Raffination. (Modern Methods of Refining Light-Metal Scrap.) Adolf Beck. *Metall,* Dec. 1947, p. 108-112.

Micrographs show the segregation of silicon from aluminum; graphs show the vapor pressure and boiling points of a number of metals and alloys; and diagrams show several types of vacuum furnaces used in the refining of aluminum.

15d-7. Remelting Light Alloys; Metallurgical and Engineering Considerations. Yves Dardel. *Metal Industry,* v. 73, July 2, 1948, p. 3-5; July 9, 1948, p. 27-30.

The mount of insoluble impurities introduced by additions of scrap when remelting light alloys is a factor of considerable importance. Sources, effect on properties, and maximum amounts permissible. Elimination of hydrogen, inverse segregation, furnace design, low-frequency induction furnaces, gas furnaces, cleaning the scrap, and degassing.

15d-8. Super-Purity Aluminium; Scrap Refining by Three-Layer Electrolysis. *Metal Industry,* v. 73, July 16, 1948, p. 51-52. Based on a recent B.I.O.S. report.

Three-layer refining furnace consists of a bath containing a layer of an Al-Cu alloy, a molten fluoride electrolyte, and a layer of molten pure Al. (To be continued.)

15d-9. A Good Recovery. *Light Metals,* v. 11, July, 1948, p. 364-373.

Obsolete aircraft released at the cessation of hostilities provided an important reserve of aluminum. The recovery of this material.

15d-10. Magnesium Alloy Scrap. A. G. Arend. *Metallurgia,* v. 38, July 1948, p. 173.

Helium is obtained in this country only as a by-product from atmospheric gas separation to the extent of 1 part in 200,000 parts of air. Availability with regard to use in reclaiming magnesium.

15d-11. Zpracovani hlinikovych odpadu, zejmena na slévaranské slitiny. (Utilization of Scrap Aluminum, Especially for Casting.) Karel Horacek. *Hutnické Listy,* v. 3, April-May 1948, p. 146-151.

Czechoslovakian practice and proposed standardization of casting alloys.

15d-12. Die Gewinnung und Verwertung der bei der Verhutting von Aluminiumschrott anfallenden Nebenprodukte. (Salvage and Utilization of By-Products From the Smelting of Aluminum Scrap.) Kurt Schneider. *Metall,* Feb. 1948, p. 35-37.

Methods of salvaging materials (such as lubricating oils, ball-mill dust, Al powder, grinding dust, salt slag and even paper) that are mixed with Al scrap.

SECTION XVI

FURNACES AND HEATING DEVICES

16a—General

16a-1. High-Temperature Equipment for Sintering Combinations of Ceramic Oxides and Metal Powders. A. R. Blackburn. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 24-28.

Equipment designed for the above.

16a-2. Economics of Radio Frequency Heating. A. P. Bock. *Product Engineering,* v. 19, Jan. 1948, p. 118-121.

Three steps for determining whether or not the use of induction or dielectric heating is justified consist of preliminary analysis, technical analysis, and final economic analysis.

16a-3. Heat Losses in Furnace Linings. J. D. McCullough. *Industrial Gas,* v. 26, Jan. 1948, p. 7-11, 29-30.

Methods of determining the losses in furnaces because of heat stored in and conducted through furnace linings.

16a-4. A Discussion of Protective Atmospheres for Metallurgical Use. Charles E. Thomas. *Industrial Gas,* v. 26, Jan. 1948, p. 14-15, 25.

Presented before Midwest Industrial Gas Council, Chicago, Oct. 22, 1947.

16a-5. Drying. Samuel J. Friedman. *Industrial and Engineering Chemistry,* v. 40, Jan. 1948, p. 18-22.

Reviews 1947 literature on drying of miscellaneous materials including finishes, and equipment for the purpose. 163 ref.

16a-6. The Domain of Radio Frequency Heating. T. P. Kinn. *Scientific American,* v. 178, Feb. 1948, p. 66-69.

Principles and applications.

16a-7. The Brown Boveri Automatic Electrohydraulic Electrode Regulation for Electric Furnaces. *Brown Boveri Review,* v. 34, April-May 1947, p. 75-80.

16a-8. The Rotary Induction Heater; a New Means of Heating Metals Inductively Prior to Working. *Brown Boveri Review,* v. 34, April-May 1947, p. 81-85.

Fundamental principles of the induction heating process. Rotary heater and its performance.

16a-9. Power and Power Factor in Arc Furnace Operation. E. H. Browning. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. 79-84; discussion, p. 84-86.

Electrical equipment requirements for operation and control; typical furnace characteristics; methods for improvement. 13 ref. (Presented at A.I.S.E. Annual Convention, Cleveland, Oct. 3, 1946.)

16a-10. How to Stop Fires in Induction Heating Equipment. E. E. Turkington. *Factory Management and Maintenance,* v. 106, Feb. 1948, p. 105-106.

16a-11. How to Maintain Infra-Red Ovens. Ira J. Barber. *Factory Management and Maintenance,* v. 106, Feb. 1948, p. 120-123.

16a-12. Un Nouveau Type de Fours a Arcs a Chargement Rapide. (A New Type of Rapidly Charged Arc Furnace). *Journal du Four Electrique et des Industries Electrochimiques,* v. 56, Feb.-Mar. 1947, p. 10-11.

A furnace of more than 6 tons capacity, which is rapidly charged by displacement of the vault and introduction of the whole charge at one time.

16a-13. Les Régulateurs Automatiques de Réglage d'Electrodes pour fours Electriques. (Automatic Controls for Regulating Electrodes in Electric Furnaces). L. Peytavin. *Journal du Four Electrique et des Industries Electrochimiques,* v. 56, April-May 1947, p. 27-29.

Necessity for controls to improve furnace output; methods and types of controls.

16a-14. Resistors for Elevated Temperatures. Without Special Atmospheres. S. H. Parsonage. *Machinery Lloyd* (Overseas Edition), v. 20, Jan. 31, 1948, p. 84-87.

Development of electrical furnace

heating elements for temperatures up to 1500° C., including the advantages and limitations of various types. The types developed by the author consist essentially of a graded conductor of Mo, W, C, or graphite contained within a ceramic tube (preferably pure Al_2O_3). Vitreous, metallized seals serve as terminals. Use of molten metals within the ceramic tube was also investigated. Pure tin was best, followed by Sn-Pb. Aluminum was not so good.

16a-15. Immersion Heating: Part III. Maurice J. Dewey, *Industrial Heating,* v. 15, Feb. 1948, p. 232, 234, 236.

Recently discovered uses to which immersion heating may be put, followed by a partial listing of industrial activities in which immersion gas heating could play an important part. (Presented at A.G.A. Industrial Gas School, Columbus, Ohio.)

16a-16. The Design of Industrial Ovens With Special Reference to Safety. Part III. C. A. Litzler. *Industrial Heating,* v. 15, Feb. 1948, p. 283, 286, 288, 290, 292, 299.

Time-delay relay systems, automatic ignition systems, and systems of temperature control. (To be continued.)

16a-17. Induction Heating Applications. N. R. Stansel. *General Electric Review,* v. 51, Feb. 1948, p. 44-50.

At all temperatures, flux distribution, eddy currents, and electrical efficiency are related through mathematical formulas. How they apply to temperatures below the melting point of conductive materials (mainly metals and alloys); to the melting of metals and alloys; and to miscellaneous applications.

16a-18. High Temperatures; Their Production, Measurement and Use. R. S. Hutton and M. Pirani. *Research,* v. 1, Feb. 1948, p. 204-207.

A review. 32 ref.

16a-19. Fundamentals of Combustion. H. C. McRae. *Industrial Heating,* v. 15, Feb. 1948, p. 238, 240, 242, 244

Fundamental considerations in burner design, furnace operation, and the choice of heating units. Discusses the theoretical and practical aspects of combustion, touching upon such subjects as the effect of air in excess, deficient, and ideal amounts; flame temperature; drafty and sealed-in combustion; and the types of furnaces and burners best suited to each. (Presented to Cleveland Chapter, American Ceramic Society.)

16a-20. Industrial Vacuum Melting. Kenneth Fox, R. A. Stauffer, and W. O. DiPietro. *Iron Age,* v. 161, Feb. 26, 1948, p. 78-84.

Materials of construction, types of heat sources, and techniques for casting under vacuum. Also includes a selected bibliography on various aspects of vacuum processing. 29 ref.

16a-21. Etude des Pertes de Chaleur dans les Fours a Marche Discontinue. (Study of Heat Losses in Furnaces Not Operated Continuously.) E. Bonnier. *Verres et Refractaires,* Dec. 1947, p. 22-26.

Ordinary methods of studying heat losses in furnaces operated intermittently proved inadequate. A striking analogy between the laws of heat propagation in a solid and those of electricity propagation in a conductor of uniform resistance and evenly distributed capacity is demonstrated. The model conceived by L. Beuken was thoroughly investigated and is believed to be promising for this investigation.

16a-22. Industrial Heating Furnaces. *Steel Processing,* v. 34, Feb. 1948, p. 90-96.

Various types.

16a-23. National Supply Co.'s New Electric Furnace. Fred Burt. *Western Metals,* v. 6, Feb. 1948, p. 26-29.

Several new design innovations. Type of work done by above company.

16a-24. High-Frequency Heating. *Automobile Engineer,* v. 38, Feb. 1948, p. 69-71.

Developments in standard equipment for a wide range of applications.

16a-25. Melting Metals by Induction Heating. N. R. Stansel. *General Electric Review,* v. 51, March 1948, p. 35-42.

Operational data, electrical features, general construction, and applications for both the coreless-induction and submerged-resistor types.

16a-26. Kunstmatige Atmosfeer in Electrische Hardingsovens. (Synthetic Atmospheres in Electric Hardening Furnaces.) *Smit Mededelingen,* v. 2, Oct.-Dec. 1947, p. 93-101.

Use of various gaseous atmospheres in annealing furnaces. Improvements are suggested and development of a small generator for small and middle-sized furnaces is recommended.

16a-27. High-Speed Gas Heating for Production Forging. Frederic O. Hess. *Industrial Gas,* v. 26, March 1948, p. 5-9, 28-30.

Applications in industry and a number of commercial high-produc-

tion machines for various types of applications. "Gradiation" machines developed by Selas Corp., Philadelphia, which move the stock through the furnace in continuous flow. Economy of time and higher quality of product are achieved by brief exposure to much higher temperatures than those to which the material is to be heated.

16a-28. Fuel Practices in a Foundry. Ira D. Findley. *Industrial Gas,* v. 26, March 1948, p. 10-11.

Use of natural gas in furnaces at the Homestead Valve Co., Coraopolis, Pa.

16a-29. Premixed Combustion for Efficient Process Heating. Edward J. Funk, Jr. *Industrial Gas,* v. 26, March 1948, p. 18-20, 22, 24-25.

Procedure and applications.

16a-30. Use of Radiant Tubes in the Infrared Process. R. Workman. *Gas Times,* v. 54, March 26, 1948, p. 413-414, 416.

Use in commercial finish-drying operations.

16a-31. Production Heat Treating. Part II. *Steel Processing,* v. 34, April 1948, p. 204-208.

Covers high-frequency induction-heating equipment, procedures, and applications. Use in joining of metals, forging, and melting. Effects on structure and transformation of steels as compared with conventional heating methods. 16 ref.

16a-32. It's Time to Act on Industrial Gas Heating. George A. Uhlmeyer. *American Gas Association Monthly,* v. 30, April 1948, p. 5-8, 36.

Report prepared at Battelle Memorial Institute as a result of a survey sponsored by A.G.A. and supervised by S. L. Case. It was concluded that, on the basis of the economic and engineering factors involved, modern gas-fired furnaces should be able to hold either an exclusive or at least a dominant position in numerous industrial-heating jobs.

16a-33. Blast Furnace Tapping Hole Construction. W. S. Unger. *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 434-438.

16a-34. All Door Front Will Permit Use of Large Charging Boxes. L. S. Longenecker. *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 447-450.

Design of doors and procedure for charging. Particular reference to open-hearth furnace is made.

16a-35. Tuyere of Novel Design Improves Furnace Operation. John H. Sprow. *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 455-456.

Double-auger type allows cleaning without interrupting operations.

16a-36. Furnaces on Skids Add Forging Flexibility. *American Machinist,* v. 92, April 8, 1948, p. 92.

Three units serve many hammers. Boat mounts for furnaces, racks for controls and plug-in connections cut moving time to less than an hour.

16a-37. Bibliography on High-Frequency Dielectric Heating. *American Institute of Electrical Engineers,* Aug. 1947, 19 pages.

Domestic references; foreign patents; and author index. Contains 393 annotated references covering period from 1925 to July 31, 1946.

16a-38. Determination of Maximum Temperatures in Combustion Chambers and Industrial Furnaces. (In Russian.) I. E. Kubynin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1411-1414.

Mathematical formulas for determination of these temperatures. Curves of oxidation and reduction processes converge at a point located on the boundary between the oxidation and reduction zones where the temperature of combustion reaches its maximum.

16a-39. Temperature Range in the Combustion Zone. (In Russian.) I. E. Kubynin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1415-1420.

A series of equations are proposed. Interpretation of the results and methods of application.

16a-40. Control of Heat Treatment: Part III. (Concluded.) A. H. Koch. *Industrial Heating,* v. 15, April 1948, p. 580, 582, 584, 586, 588, 712, 714.

Modern developments in both theory and practice in controlled atmospheres and atmosphere generators, and their possibilities and limitations. Methods of obtaining a proper quench from the various types of furnaces.

16a-41. Heating Methods for Controlled Atmosphere Furnaces. W. H. Holcroft and M. R. Larson. *Steel,* v. 122, April 26, 1948, p. 100-103.

Requirements of continuous muffle-type, radiant-tube and direct-electric heating furnaces for gas carburizing, carbo-nitriding, malleable annealing and other high-production processes.

16a-42. Combustion in Oxygen and Oxygen-Enriched Air. H. R. Fehling. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 99-101; discussion, p. 101-102. Condensed from

Iron and Coal Trades Review, v. 66, Jan. 23, 1948, p. 165-167, 177.
Fundamental and practical standpoints. Use of oxygen may eliminate need for regenerators on openhearth and similar furnaces.

16a-43. Design and Performance of a Refractory Recuperator. E. G. Smith. *Iron and Steel Engineer,* v. 25, April 1948, p. 106-112; discussion, p. 112.
The vertical tube refractory recuperator is said to be proving itself for soaking pits and slab-reheating furnaces. Possibility of its application to the openhearth. Comparison for several types and advantages over direct-fired furnaces and soaking pits. (Presented at A.I.S.E. annual convention, Pittsburgh, Sept. 25, 1947.)

16a-44. National Tube Builds New Coke Plant at Lorain. *Iron and Steel Engineer,* v. 25, April 1948, p. 113-115.

16a-45. Recirculation of Gases. E. Watkinson. *Journal of the Institute of Fuel,* v. 21, April 1948, p. 177-184.
Recirculation of gases is common practice with many types of furnaces, stoves, ovens, and heat exchangers working at 850° C. and under. Typical examples include the heat treatment of steel, the heating, heat treatment and aging of aluminum and its alloys, the drying and baking of molds and cores used in foundry practice; and many other processes.

16a-46. Make Your Furnace-Design Specifications Work for You. N. J. Connors. *Power,* v. 92, May 1948, p. 102-104.
Recommends writing specifications in terms that relate heat release to performance, gas temperatures to measurement, and ash to firing.

16a-47. High Temperature Vacuum Furnace. *Iron Age,* v. 161, May 6, 1948, p. 93.
Construction of Swedish furnace suitable for temperatures up to 3990° F., described more fully in *Engineers' Digest,* Dec. 1947, p. 578.

16a-48. Furnaces and Fuels for Heat Processing Metals. Floyd E. Harris. *Steel,* v. 122, May 10, 1948, p. 90-94.
Controlling factors involved in attacking heating problems and in determining atmosphere applications and surface effects are analyzed in order to improve equipment.

16a-49. Preheating of Fuel in Shaft Furnaces and Gas Generators. (In Russian.) B. V. Kantorovich. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Jan. 1948, p. 43-52.
Process was investigated theoretically. Equations are derived for determination of the values involved. 10 ref.

16a-50. Large Conveyerized Core Ovens Feature Ford Foundry Rehabilitation Program: Part II (Concluded.) *Industrial Heating,* v. 15, May 1948, p. 829-830, 832, 834, 836.
Vertical ovens, a tractor-part core-baking oven, general equipment for baking molds and cores, and other foundry improvements.

16a-51. Industrial Infrared Heating by Gas. A. G. F. Macadam. *Gas Journal,* v. 254, May 5, 1948, p. 272, 275-276, 281.
Miscellaneous applications and equipment—for paint drying, for drying ceramic ware, for drying vitreous enamel, and in the printing industry.

16a-52. Some Recent Heat Treatment Furnace Installations. *Metallurgia,* v. 38, May 1948, p. 50-57.

16a-53. The Melting of Small Charges of Finely Divided Metals in Vacuo in Medium Frequency Induction Furnaces. E. A. Brandes. *Research,* v. 1, May 1948, p. 382-383.
The interposition of a graphite or molybdenum sleeve within the vacuum between the crucible and the coil to give increased heat input to the charge is fairly well known. There are, however, objections to the use of graphite in vacuum furnaces for certain melting operations. A simple method for the construction of sleeves from molybdenum wire.

16a-54. Radiative and Convective Heat Transfer Rates Pertaining to Heating Processes; a Theoretical Comparison. Jack Huebler. *Industrial and Engineering Chemistry,* v. 40, June 1948, p. 1094-1098.

16a-55. The Practical Economics of Radio Frequency Heating. B. T. P. Kinn. *Iron Age,* v. 161, June 10, 1948, p. 72-79.
A simple, quick method of determining the economic feasibility of radio frequency heating or dielectric heating by means of some simple arithmetical calculations and a series of check charts.

16a-56. Sur la fusion continue des substances au four solaire. (Continuous Melting of Substance in a Solar Furnace.) Félix Trombe, Marc Foex, and Charlotte Henry La Blanchetais. *Comptes Rendus* (France), v. 226, Jan. 5, 1948, p. 83-85.
To obtain appreciable amounts of molten material, continuous feeding

with pulverized material is necessary. Device developed for this purpose.

16a-57. Determination of Optimum Schedules for Heating up Electric Furnaces. (In Russian.) B. S. Meshel. *Promyshlennaya Energetika* (Industrial Power), v. 5, Feb. 1948, p. 7-10.

A new formula permits rapid, simple, and exact determination. Methods of obtaining necessary data.

16a-58. A Comparison of Coal and Oil Firing. A. C. Dunningham. *Fuel,* v. 27, Jan.-April 1948, p. 4-9.

Only small increases of efficiency can be expected with oil firing. This is confirmed by reference to actual results obtained on industrial boiler plants for which steam costs are estimated to be about 50% higher than with oil firing. As regards furnaces used in the nonferrous metallurgical and chemical industries there is much more scope for improved performance, both as regards efficiency and output, but in most cases costs are higher with oil. The most promising application of fuel oil from an economic standpoint consists in its use in small amounts to assist the combustion of low-grade fuels.

16a-59. The Use of Propane and Butane Gases. E. A. Jamison. *Industrial Heating,* v. 15, June 1948, p. 948, 950, 952, 954, 956, 958.

Miscellaneous industrial heating applications.

16a-60. Furnace Design for Better Utilization of Fuel. Floyd E. Harris. *Metal Progress,* v. 53, June 1948, p. 817-822.

Abstracted from *Steel,* v. 122, May 10, 1948, p. 90-94. See item 16a-48, 1948.

16a-61. Needs in Furnace Development and Fuel Utilization for the Metal Industry. F. E. Harris. *Steel Processing,* v. 34, June 1948, p. 313-317, 319.

Abstracted from *Steel,* v. 122, May 10, 1948, p. 90-94. See item 16a-48, 1948.

16a-62. Induction Heating of Hollow Objects by Means of Electroconductive Rods. (In Russian.)N. M. Rodigin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 225-238.

A mathematical analysis of the problem. A series of equations are proposed for cylinders consisting of one or more layers.

16a-63. High-Frequency Heating of Bolt Blanks. *Machinery* (London), v. 72, June 24, 1948, p. 764.

16a-64. Needs in Furnace Development and Fuel Utilization for the Metal Industry. F. E. Harris. *Industrial Gas,* v. 26, June 1948, p. 8-11, 30.

Previously abstracted from *Steel,* v. 122, May 10, 1948, p. 90-94. See item 16a-48, 1948,

16a-65. The Cupola as a Precision Instrument. R. C. Tucker. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B66-B69; discussion, p. B69.

Design, raw materials, and operation. Necessity for a high degree of uniformity in melting rate, metal temperature, and daily quality.

16a-66. Electric Furnaces for the Wire Industry; Modern Equipment and Processes Described. Part I. H. J. Tucker and J. A. Monks. *Wire Industry,* v. 15, June 1948, p. 385-387.

Bell-base furnaces, pit and vertical furnaces, continuous strand-type furnaces, and continuous furnaces for bright annealing nonferrous material. (To be continued.)

16a-67. Infra-Red Drying. *Sheet Metal Worker,* v. 39, July 1948, p. 48-50.

Approved practices and booth design for painted metal surfaces.

16a-68. Heating Metals by Induction and High-Speed Gas Methods. H. R. Clauser. *Materials & Methods,* v. 28, July 1948, p. 55-59.

Relative advantages and disadvantages of both methods and also compares them with conventional furnace methods. (Partially based on a report prepared for the A.G.A. by Battelle Memorial Institute.)

16a-69. Electrically-Conductive Rubber. *Materials & Methods,* v. 28, July 1948, p. 60-61.

Properties and applications of new product. Among the latter are panels for space heating and for miscellaneous industrial heating applications.

16a-70. Trends in Induction Heating. H. B. Osborn. *Steel Processing,* v. 34, July 1948, p. 360-361.

A condensation.

16a-71. Principal Limitations of Dielectric Heating. Carl J. Madsen. *Industrial Heating,* v. 15, July 1948, p. 1146, 1148, 1150.

Major limitations that prevent universal application.

16a-72. Proper Frequency for Induction Heating of Nonmagnetic Metals. J. T. Vaughan and H. B. Osborn, Jr. *Metal Progress,* v. 54, July 1948, p. 46-50.

Heating of nonmagnetic materials such as copper, aluminum, or austenitic steels. However steel, a magnetic material, loses its magnetic properties in the temperature range used for hardening or forging, so

the information is also applicable to induction heating of steel.

16a-73. Furnaces for By-Product Fuels. Otto de Lorenzi. *Transactions of the American Society of Mechanical Engineers,* v. 70, May 1948, p. 351-358; discussion, p. 358-362.

A number of furnace designs developed to handle byproduct fuels from oil-refinery operations, and the manufacture of steel, coke, lumber, pulp, and sugar.

16a-74. How to Design Work Coils for Induction Heating. Ben H. Griffith, Jr., and Ray Skiba. *American Machinist,* v. 92, Aug. 12, 1948, p. 99-110.

Practical mechanics of coil construction, and methods of arriving at final coil design, theoretical calculations leading to design, applications.

16a-75. Electric Furnaces for the Wire Industry. Part 2. H. J. Tucker and J. A. Monks. *Wire Industry,* v. 15, July 1948, p. 451-454.

Protective atmosphere generators and continuous wire-patenting furnaces. (To be continued.)

16a-76. Basic Structural Design and Operating Conditions of Electric Ore-Melting Furnaces. (In Russian.) S. S. Mikulinsky. *Promyshlennaia Energetika* (Industrial Power), no. 4, April 1948, p. 1-3.

Criteria of structural design and operating conditions of electric ore-melting furnaces and the determination of optimum conditions. Experimental results demonstrate the validity of computations.

16a-77. Automatic Regulation for Electric Ore Melting Furnaces. (In Russian.) Yu E. Efroimovich. *Promyshlennaia Energetika* (Industrial Power), no. 5, 1948, p. 7-9.

Circuit diagrams of the automatic regulator for electric ore-melting furnaces. The theoretical bases and the computations of the relay coefficients.

16a-78. Heating Factory Furnaces With Flameless Gas. (In Russian.) V. S. Gavripenko. *Promyshlennaia Energetika* (Industrial Power), no. 5, 1948, p. 9-11.

Technical characteristics of certain forging furnaces using flameless combustion.

16a-79. Trends in Salt Bath Heat Treatment. H. J. Babcock. *Steel Processing,* v. 34, Aug. 1948, p. 435-438.

Condensed from an address dealing with mechanized operations and production units.

16a-80. Induction and Dielectric Heating. G. W. Scott. *Electrical Engineering,* v. 67, Sept. 1948, p. 847. Based on paper to be published in *A.I.E.E. Transactions,* v. 67, 1948.

Principles, advantages, and applications.

16a-81. Tagged Atoms Go to Work for Steel. Charles Ellsworth. *Steelways,* Sept. 1948, p. 26-28.

Tells how radioactive sulphur was used to follow the sulphur atoms in coal through the coking process, leading to the conclusion that it is impossible to get low-sulphur coke by buying coal which, though high in sulphur content, might contain its sulphur in a form which would largely eliminate itself during coking.

16a-82. Electric Firing Cheap as Gas, Oil in Shortest Continuous Furnace. *Ceramic Industry,* v. 51, Sept. 1948, p. 72-73.

Continuous, automatic, straight-through, electric, porcelain-enameling furnace.

16a-83. Straight-Line Heating Provides Fast Method of Processing Long Straight Metal Stock. S. M. Stoler. *Steel,* v. 123, Sept. 13, 1948, p. 105-106.

"R-S Hi-Head" system which consists essentially in use of an extremely high thermal head in multiple heating chambers through which the workpieces are rapidly passed by mechanical means. Uniform heating from skin to core is thus accomplished, while surface scale, decarburization, and grain growth are precisely controlled, resulting in high-quality output.

16a-84. Industrial Electronic Heating. *Brown Boveri Review,* v. 35, March-April 1948, p. 95-98.

Principles and industrial application of high-frequency heating for metallic and nonmetallic materials.

16a-85. Four Station Electric Resistance Heater. *Product Engineering,* v. 19, Sept. 1948, p. 90-92.

Equipment for heating forging blanks.

16a-86. Needs in Furnace Development and Fuel Utilization for the Metal Industry. F. E. Harris. *Industrial Heating,* v. 15, Sept. 1948, p. 1514, 1516, 1518, 1520, 1522, 1524, 1526, 1528, 1538.

Heating rates, problems in heat application and surface effects, and problems other than heating. Differential heating, effect of head temperatures on heating time, heating in batch furnaces, heating in a continuous furnace, location of thermocouples, furnace ratings at various head temperatures, a sol-

dered plug assembly, processing of springs, and atmosphere control.

16a-87. Oil-Fired Open Hearth Furnaces; A Review of British Practice. T. C. Bailey. *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels*, Birmingham Univ., London, Sept. 21-23, 1948, (Advance Copy), 18 pages.

Attempts to establish what may be considered standard practice. Where improvements are necessary, suggesting probable lines of development.

16a-88. A Problem in Sequenced Motor Controls. R. H. Mecklenborg. *Electrical Manufacturing,* v. 42, Sept. 1948, p. 120-122, 124.

Use of nine limit switches and four synchronous motor timers, with the aid of a novel reset relay, gives completely automatic cycle control to heat treating process equipment, with adequate protection in the event of power failure.

16a-89. Semi-Producer Furnaces; Modern Design for Efficient Combustion of Coke. *Iron and Steel,* v. 21, Sept. 1948, p. 424.

New type made in Britain provides controlled heat with practically automatic firing, without moving parts, without smoke or contamination, and with a minimum of attention.

16a-90. Un nouveau four a arc pour les recherches électro-métallurgiques. (A New Electric-Arc Furnace for Electrometallurgical Research.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, May-June 1948, p. 49-51.

Experimental-size furnace with a hydraulically operated electrode and three melting pots.

16a-91. Le four a arc rayonnant en fonderie. (Radiant Arc Furnace for the Foundry). *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, May-June 1948, p. 55-58.

Details of Heroult type furnace, including circuit diagrams and operating techniques.

16a-92. Calorimetric Method for Determination of the Energy Produced During High-Frequency Heating. (In Russian.) S. M. Gamazkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, July 1948, p. 880-881.

16a-93. Design and Manufacture for Profit by Means of High-Frequency Induction Heating. H. B. Osborn, Jr. *Mechanical Engineering,* v. 70, Oct. 1948, p. 805-810.

Principles of high-frequency heating and the design of parts so processed.

16a-94. Experience with High-Frequency Heating. H. R. Winemiller and Harold Bunte. *Electrical Engineering,* v. 67, Oct. 1948, p. 981-984.

General advantages and disadvantages, followed by discussion of miscellaneous industrial applications.

16a-95. Single Vs. Multi-Turn Induction Heating Coils. Frank W. Curtis. *Tool Engineer,* v. 21, Oct. 1948, p. 38.

16a-96. Gadgets. *Tool Engineer,* v. 21, Oct. 1948, p. 41-42.

Induction Heating Coil Made Adjustable, C. W. Frank; Coiling Enamel Coated Wire, E. A. Ryder; To Remove Broken Stub Shafts, (from *Verkstäderna* (Sweden)); and Rotary Drill Jig Features Simple Design, Robert Mawson.

16a-97. Significance of Recent Improvements in High Speed Heating by the Gradiation Technique. Davidlee Von Ludwig. *Industrial Gas,* v. 27, Oct. 1948, p. 5-8, 28-32.

Technique and apparatus developed for controlling the rapid heating of metals with gaseous fuels. The heating panels are arranged so that their distance from the work is automatically varied to maintain the desired temperatures.

16a-98. Recent Developments in Industrial Uses of Gas. C. B. Phillips. *Industrial Gas,* v. 27, Oct. 1948, p. 16-17, 27-28.

Several new applications to metallurgical furnaces and ovens.

16a-99. Oil Standby Equipment Installed on Gas Furnaces. Paul Metzger. *Steel Processing,* v. 34, Oct. 1948, p. 558-559.

16a-100. Contribution a l'étude des connexions soumises a des chauffages répétés. (The Problem of Electrical Connections Subject to Repeated Heating.) Jean Bernot. *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, July-Aug. 1948, p. 82-85.

The above problem applies particularly to the points of attachment of metallic conductors to, for instance, silicon carbide electrodes. As a result of a theoretical analysis of the problem, a new method of calculation is proposed which makes it possible to predict the applicability of certain metals and alloys for joining heating elements.

16a-101. Sintering Furnaces and Atmospheres. H. C. Bostwick. *Industrial*

Heating, v. 15, Oct. 1948, p. 1664-1666, 1668, 1670, 1672, 1674, 1676, 1678, 1831-1832.

Furnaces and auxiliary equipment for production of powdered-metal compacts.

16a-102. Combination Gas-Oil Burners Installed in Continuous Forging Furnaces. *Industrial Heating*, v. 15, Oct. 1948, p 1696, 1818.

Installation made to prevent shutdowns during periods of gas shortage.

16a-103. Combustion Safeguards Applied to Infra-Red Radiant Gas-Fired Incandescent Units. *Industrial Heating*, v. 15, Oct, 1948. p. 1698, 1839-1840.

Use of commercial device which, in case of pilot-flame failure or gas shut-off, closes the main valve of the burner, thus preventing possible explosions.

16a-104. Vertical Tower Oven With New Type Conveyor System. *Industrial Heating*, v. 15, Oct. 1948, p. 1788, 1790.

New type of oven designed to conserve floor space. Tower contains a gas-fired oven, through which the conveyer runs, and carries work which has been painted, to be baked, cured, or dried.

16a-105. Furnaces with "Leaky" Walls. W. Trinks. *Industrial Heating*, v. 15, Oct. 1948, p. 1795-1796, 1798.

Points out little-understood fact that the extra heat carried out of furnaces with leaky or permeable walls, when there is a positive pressure in the furnace, does not represent a waste of heat, or cause lowered efficiency, since the same gas would leave by way of the flues. Actually, true conduction loss is shown to be reduced slightly by leakage, because the temperature gradient is decreased, This idea has been applied commercially in England to several types of furnaces, in which an ejector is provided to pull the gases through the permeable walls, other flues not being necessary. Savings up to 35% in fuel are reported.

16a-106. Controlled-Atmosphere Electric Furnaces — Their Present State and Application. C. E. Peck. *Westinghouse Engineer*, v. 8, Nov. 1948, p. 162-166.

Compositions and costs of typical controlled furnace atmospheres, and atmospheres suitable for heat treatment of different metals.

16a-107. Split Type Electric Furnace for Galvanizing Baths. Wallace G. Imhoff. *Iron Age*, v. 162, Nov. 11, 1948, p. 114-115.

Sectional and ring-type furnaces, developed in Australia, which are especially designed to permit rapid and easy removal of the furnace from around the kettle. Other features are close and automatic temperature control and distributed heat input for optimum efficiency.

16a-108. Container Heating Methods and Their Efficiency as Applied on Extrusion Presses. Joseph Bronner. *Machinery Lloyd* (Overseas Edition), v. 20, Oct. 23, 1948, p. 72-75.

Refers to outer sections of extrusion presses. During extrusion, the equipment must be kept at the temperature of extrusion—250 to 500° C., depending on the metal being extruded. The various methods for applying this heat. Recommends use of a new type of internal heating using electrical heating elements. Advantages of high efficiency of heat utilization and smaller structural strains caused by temperature gradients.

16a-109. The Calculation of Heat Transfer Through Two-Media Furnace Walls. Agnes H. Waddell. *West of Scotland Iron and Steel Institute, Journal*, v. 54, 1946-47, p. 205-220.

Mathematical analysis of the problem. 12 ref.

16a-110. Pre-Mixed Combustion for More Efficient Process Heating in Industry. Edward J. Funk, Jr. *Industrial Heating*, v. 15, Nov. 1948, p. 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1916.

Equipment, methods of mixing, advantages, factors to be considered, and applications.

16a-111. Automatic Drying Ovens. Christian F. Scheehle, Jr. *National Lithographer*, v. 55, Nov. 1948, p. 34-35, 76, 78.

History and present-day ovens for drying and baking finishes on metals.

16a-112. Power Requirements for Heating Materials by Infra-Red. *Materials & Methods*, v. 28, Nov. 1948, p. 95.

Approximate determinations for common metals and non-metals, as well as for any material whose specific heat is known.

16a-113. Starting a Hydryzing Generator. Paul E. Busby and Cecil C. Busby. *Metal Progress*, v. 54, Nov. 1948, p. 689.

Setup using a natural-gas pilot flame to avoid the dirt and inconvenience associated with use of an ignited oily rag.

16a-114. Factors Affecting Infrared Tunnel Design. *Sheet Metal Worker*, v. 39, Nov. 1948, p. 35-37.

Design of drying tunnels for painted or enameled metal objects.

16a-115. Induction Heating in Relation to Industrial Gas Heating. S. L. Case, L. R. Jackson, and R. J. Lund. *American Gas Association* (New York), March 1948, 47 pages.

Findings of a survey made to appraise the competitive position of gas and induction heating and to attempt to predict their future position. Various types of burners and industrial furnaces. Technological and economic aspects.

16a-116. Protective Atmospheres in Industry. Part I. A. G. Hotchkiss and H. M. Webber. *General Electric Review,* v. 51, Nov. 1948, p. 29-35.

Miscellaneous applications, including necessary equipment. This section is devoted mainly to metallurgical applications, but also mentions uses in the paint and varnish industry. Compositions and production costs of typical atmospheres. (To be continued.)

16a-117. Elimination of Standing Waves on Electrodes for High-Frequency Dielectric Heating. E. R. Bell and M. E. Dunlap. *Technical Data Digest,* v. 13, Dec. 15, 1948, p. 13-21.

Standing waves on long electrodes can be avoided by multiple tuning with use of relatively high frequencies, and by connecting the generator to the electrodes at two points when using low frequencies. The choice of method depends upon several factors, such as type of press, and voltage limitations. Both methods, and also the procedure of heating a long member in successive short sections, appear to be equally satisfactory.

16a-118. Electric Apparatus for Three-Phase Arc-Furnaces. N. R. Stansel and A. R. Oltrogge. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 191-202; discussion, p. 202.

16b—Ferrous

16b-1. Producer-Gas. J. E. de Graaf. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 566-569; discussion, p. 627-629.

Results of a Dutch investigation of the effects of variations in tar content, composition, and moisture content of producer gas on the performance of openhearths, as well as the relationship of these variations to the coal used. Frequent determination of tar and moisture content is feasible and worth while.

16b-2. Anthracite as Cupola Fuel. Part II. (Concluded.) C. C. Wright. *American Foundryman,* v. 12, Dec. 1947, p. 34-37.

Abstracted from *Transactions of the Fifth Annual Anthracite Conference of Lehigh University,* 1947, p. 123-154.

16b-3. Openhearth Design. Vincenzo Ferri. *Iron and Steel,* v. 20, Dec. 1947, p. 649-651, 657.

The Terni furnace was first studied and used in an Italian steelworks but was abandoned. More highly resistant refractories since developed and other simple modifications would eliminate the defects which caused abandonment. The essential feature of the furnace is the port design. The air ports gradually increase in cross section until they are as large as the hearth itself, thus practically eliminating turbulent flow in the furnace, which is said to result in increased output and reduced fuel consumption. (Condensed from *L'Ingegnere,* Sept. 1947.)

16b-4. Heating Rates in Electric Furnaces. G. B. Lamb. *Machinery (London),* v. 71, Dec. 11, 1947, p. 661-663.

Experiments were made to determine the times required for heating mild steel bars to the center in a workshop furnace 10 in. in diameter by 20 in. deep.

16b-5. Over de Haard van de Koepeloven. (The Hearths of Cupola Furnaces.) J. Derlage. *Metalen,* v. 2, Nov. 1947, p. 49-53.

Practical results with different types of cupola furnaces. Design factors.

16b-6. Large and Unique Furnaces Used in Manufacturing Propeller Blades at Hamilton-Standard Plant. *Industrial Heating,* v. 15, Jan. 1948, p. 22-24, 26, 28, 30, 32, 34, 36-38, 170, 172.

Procedures and equipment. The blades are hollow and are made of steel by various steps including upset forging, stamping, hot forming, heat treatment, annealing, brazing.

16b-7. Construction and Repair of Openhearth Furnaces. D. C. Muir. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 481-491.

The furnace repair program at Consett Iron Co., Ltd., over a period of seven years, and a system of balanced repairs which enabled nine out of ten furnaces to be in production at any one time. Construction, life, replacement, and costs of refractories in various parts of the furnaces; the all-basic furnace; furnace insulation; conversion of the furnaces from producer gas to creosote-pitch, coke-oven or gas firing.

16b-8. The Design of Openhearth Gas Ports. M. P. Newby. *Journal of the*

Iron and Steel Institute, v. 157, Dec. 1947, p. 601-608.

Experiments were conducted on a model of the gas port of a producer-gas-fired openhearth furnace to determine the efficiencies for converting pressure energy into kinetic energy of gas motion; resistance to stack gases was also measured. The designs tested have fairly high efficiency and changes can bring only limited improvement.

16b-9. Tower-Type Recuperative Electric Furnace for Continuous Bright Annealing of Sheet Steel. (In Russian.) O. A. Moschanskogo and I. A. Tvorogova. *Promyshlennaya Energetika* (Industrial Power), v. 4, Oct. 1947, p. 8-9.

An installation in which the coil of sheet steel moves first up through a tower, the top part of which consists of an electric furnace, and then back down through the same tower. This causes the heat liberated from the steel as it moves downward to be quite efficiently picked up by the steel moving upward, which latter is only a few inches away.

16b-10. The Induction Heated Cupola. *Iron Age,* v. 161, Feb. 5, 1948, p. 76-78.

In order to overcome the lack of quality coke and also to improve melting conditions for production of high-test irons and high-carbon alloy steel castings, use of a melting unit which combines the features of a cupola and an electric induction furnace was proposed by E. Piwowarsky of Germany. Some of the design considerations of such a unit, and constructional details of an experimental model.

16b-11. Progress in Openhearth Valve Design. *Steel,* v. 122, Feb. 9, 1948, p. 90, 93-94.

New types have cast-iron dampers closing to stack flue and separate gate valves closing to air fan, both held against the seat by air pressure and stack suction. Heat from waste gases is recovered by inflowing air.

16b-12. The Operation of a Gas-Fired Enameling Furnace. S. E. A. Ryder. *Gas Journal,* v. 253, Jan. 14, 1948, p. 113-114, 119.

Details of British installation, its operation, and performance. (Presented at 13th Annual Conference of the Institute of Vitreous Enamellers, Nov. 1947.)

16b-13. The High Frequency Furnace in the Steel Foundry. D. K. Barclay. *Journal of Scientific and Industrial Research,* v. 6A, Sept. 1947, p. 372-374.

16b-14. Some Features of Openhearth Furnace Design — Part IV. (Concluded.) G. Reginald Bashforth. *British Steelmaker,* v. 14, Jan. 1948, p. 34-41.

Tilting furnaces; mixed-gas furnaces; oil-fired furnaces; refractory materials.

16b-15. Hot and Cold Blast Mixing Device Gives to Blast a Uniform Temperature. H. E. McDonnell. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 91-93.

Device recently introduced at Weirton Steel and its performance.

16b-16. Two 1500-Ton Blast Furnaces Now Under Construction at South Works, by Carnegie-Illinois Steel Corp. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 94-98.

Details of design and materials being used.

16b-17. Dual Tempering Treatment Accomplished in One Operating Cycle by Continuous Draw Furnace. *Steel,* v. 122, Feb. 16, 1948, p. 104.

Furnace was designed and constructed by Holcroft & Co., Detroit. Parts processed are S.A.E. 5140 shafts with integral gears, machined from an upset forging and hardened to Rockwell C-57 to 61.

16b-18. Gaseous and Liquid Fuels in Iron and Steel Works; Engineering Aspects of Distribution and Utilization. J. B. R. Brooke and J. S. Bryan. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 111-124.

A British steelworks which was built 35 years ago, and has been altered and enlarged repeatedly since then. Diagrams show the fuel-gas distribution system, and means for its control and utilization, including burner design.

16b-19. Soaking Pits. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 125-137.

The main features and operation of four types of soaking pits of modern construction: reversing pit of the conventional type with new features; circular tangentially fired pit of the recuperative type; one-way fired pit of the recuperative type; and bottom-fired pit of the recuperative type. These four types were selected because the means of flame propagation are different, the conditions of gas flow are dissimilar, and the heating chambers contrast in size and shape; yet all successfully perform the process for which they were developed.

16b-20. Thermochemical Analysis of Combustion in a Cupola. H. Edward

Flanders. *American Foundrymen's Assoc. Preprint* No. 47-50, 1947, 11 pages.

Two equations by which heat of combustion and maximum combustion temperature may be calculated. It is possible, through use of such equations, to estimate immediately the relative effect of preheating of blast air, or of removal of moisture from the blast, on the heat of reaction or the maximum temperature attainable. 14 ref.

16b-21. Operation of a Gas-Fired Enameling Furnace. S. E. A. Ryder. *Gas Times,* v. 54, Jan. 30, 1948, p. 162, 164-166.

Previously abstracted from *Gas Journal,* v. 253, Jan. 14, 1948, p. 113-114, 119. See item 16b-12.

16b-22. Modern Design of Multiple Fuel Steam Unit. A. R. Mumford. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 88-97; discussion, p. 97-98.

Some of the factors which influence availability. Slag and the control of its deposition is improved by use of cooling screens, improved burner position, and perhaps the relation of the area of the flame envelope to the water-cooled area of the furnace. Illustrated by six recent designs of steam generators for the steel industry. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 23, 1947.)

16b-23. Hot Blast Stove Gas Burner Gives Soft Mellow Flame. S. P. Kinney. *Blast Furnace and Steel Plant,* v. 36, Feb. 1948, p. 217-219.

Improved type.

16b-24. Electric Heating of Strip Steel for Continuous Processing. *Industrial Heating.* v. 15, Feb. 1948, p. 256, 258, 260.

Reviews papers by A. R. Ryan and F. E. Ackley in which electric furnace heating, resistance heating, and induction heating were discussed. (Presented at recent A.I.S.E. convention, Pittsburgh).

16b-25. Large Car-Type Furnaces Featured at Pearson Industrial Steel Treating Co. Part II. *Industrial Heating,* v. 15, Feb. 1948, p. 310-312, 214, 316.

Concluding article describing the heat treating facilities covers the box-type high-temperature furnaces, the salt-pot furnaces, and the car-type furnaces, together with their quenching and control equipment; and also the finishing and surface-preparation equipment which includes a degreaser, three sand blasting machines, two hardness testers, and a straightening press.

16b-26. Special Induction Heating Setup Tempers Spline Bores of Gears. P. A. Hassell. *Automotive Industries,* v. 98, Feb. 15, 1948, p. 44, 84, 86.

Use of equipment developed by Allis-Chalmers.

16b-27. De Houtskoolhoogoven. (The Charcoal Blast Furnace.) W. H. A. van Alphen de Veer. *Metalen,* v. 2, Feb. 1948, p. 117-120.

Sweden is still producing appreciable quantities of pig-iron in charcoal-blast furnaces. This pig-iron is very pure and is therefore mainly used for the production of high-quality steel. As this type of blast furnace is not so well known in other countries, a short description is presented, including details about the raw materials used, the charging of the furnace, and the special method of heating the air.

16b-28. The Operation of a Gas-Fired Furnace for Vitreous Enameling. S. E. A. Ryder. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 339-344.

Previously abstracted from *Gas Journal.* See item 16b-12, March 1948 issue of *Metals Review.*

16b-29. Economic Considerations for Stack Lining Repairs. W. R. Trognitz. *Iron and Steel Engineer,* v. 25, March 1948, p. 65. Condensation.

Previously abstracted from *Steel,* v. 122, March 1, 1948, p. 110-112. See item 17-25, 1948.

16b-30. The Operation of a Gas-Fired Porcelain Enameling Furnace. S. E. A. Ryder. *Enamelist,* v. 25, March 1948, p. 28-35, 38-41.

Previously abstracted from *Gas Journal,* v. 253, Jan. 14, 1948. See item 17-25, 1948.

16b-31. Fifty-Ton Electric Furnace. *Western Machinery and Steel World,* v. 39, March 1948, p. 112.

At the Los Angeles plant of Bethlehem Pacific Coast Steel Corp.

16b-32. Heat Treating by "Blue Blade". K. I. Robinson. *Industrial Gas,* v. 26, March 1948, p. 15, 26-28.

Furnace equipment and procedures in production of safety-razor blades.

16b-33. Coke Bed Ignited Electrically. *Pig Iron Rough Notes,* Winter 1948, p. 28-29.

Electric-arc device. A material cost saving of approximately $100 per mo. is claimed.

16b-34. British Annealing Furnace Heat Treats 45-Ton Plates. *Steel,* v. 122, April 12, 1948, p. 104, 106. Reprinted from *Iron and Coal Trades Review.*

16b-35. Les Fours de Recuit de la Malléable. (Annealing Furnaces for Malleable Cast Iron.) Gabriel Joly.

Fonderie, Dec. 1947, p. 965-969; discussion, p. 969-970.

Types of furnaces were investigated.

16b-36. Liquid-Fuel Firing, With Special Reference to Openhearth Furnaces. F. A. Gray. *Iron and Steel Institute, Special Report* No. 39, "Reports of the Affiliated Local Societies", Dec. 1947, p. 60-80.

Properties of available liquid fuels; in particular, oil fuels are considered with regard to their use in the openhearth furnace. Liquid fuels are compared with other openhearth fuels; in particular, oil fuels are conpower, furnace efficiency, steel output and quality, and furnace design. Oil-firing equipment and required modifications in the design of gas-fired furnaces.

16b-37. The Thermal Efficiency and Economics of Oil Firing. G. Reginald Bashforth. *British Steelmaker,* v. 14, April 1948, p. 170-176.

Based on a panel discussion. Refers to the iron and steel industry. 11 ref.

16b-38. World's Largest Salt Bath for Descaling Plate and Sheet. John S. Morris. *Industrial Heating,* v. 15, April 1948, p. 568-572, 574, 576, 578, 710, 720, 722.

Electrically heated salt pot, believed to be the largest of its kind in the world, is 40 ft. long, 6 ft. 4 in. wide and 12 ft. deep. Other equipment also described.

16b-39. Soaking Pit Operation. *Industrial Heating,* v. 15, April 1948, p. 616, 618, 620, 622. Condensed from paper by H. V. Flagg.

Various designs of soaking pits and some difficulties encountered in their operation. (Presented at recent annual convention, A.I.S.E., Pittsburgh.)

16b-40. Large Conveyerized Core Ovens Feature Ford Foundry Rehabilitation Program. *Industrial Heating,* v. 15, April 1948, p. 647-648, 650, 652, 654, 656, 658.

(To be continued.)

16b-41. Construction and Operation of an Oil-Fired Malleable Iron Holding Furnace. F. Coghlin, Jr. *American Foundrymen's Association, Preprint* No. 48-18, 8 pages; discussion, p. 8.

The refractory layout, the oil-burner system, the atmosphere-control system, operating methods and data, and some brief comparisons with coal firing.

16b-42. Flush-Hole Maintenance. G. C. Lawton. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 83-85; discussion, p. 85-88.

Experiences at Inland Steel while shifting from scrap to high-metal basic openhearth practice. Recommendations for reduction of flush-hole losses.

16b-43. Bottom Maintenance. J. P. L. McMahon. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 89-90; discussion, p. 90-98.

Procedures recommended and practice at several mills.

16b-44. Furnace Maintenance. G. H. Todd. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 98-104; discussion, p. 104-108.

Practice at Ashland mill of Armco. Discussion of practice at several other mills.

16b-45. The Application of Fuel Oil and Surplus Gas at an Integrated Iron and Steel Works. J. Sinclair Kerr. *Journal of the Institute of Fuel,* v. 21, April 1948, p. 165-176.

Utilization of surplus gases in an integrated iron and steel works. Stress is placed on the value of instrumentation and automatic control for obtaining consistent operating conditions. The use of fuel oil in place of producer gas for the firing of openhearth furnaces. The instrumentation required for an oil-fired furnace. Comparison is made between results obtained with oil firing on the ordinary 50-ton basic openhearth furnace and on an all-basic furnace of the same size fired by producer gas.

16b-46. Here's a Way to Preheat Castings. *Linde Tips,* v. 27, April 1948, p. 34-35.

Temporary firebrick furnace for preheating prior to welding.

16b-47. Novel Design for British Steel Melting Furnaces. Ian Cox. *Blast Furnace and Steel Plant,* v. 36, May 1948, p. 561.

New type which allows more combustion and hotter flame.

16b-48. Multiple Fuel Burners for Openhearth Furnaces. J. M. Brashear. *Iron and Steel Engineer,* v. 25, May 1948, p. 60-66; discussion, p. 66-68.

Design details and combustion data. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 25, 1947.)

16b-49. Recuperation Improves Furnace Efficiency and Operation. Frank

D. Hazen. *Industrial Heating,* v. 15, May 1948, p. 786, 788, 790, 792, 794, 796.

Advantages, design drawings and performance charts for steelmaking and processing furnaces.

16b-50. L'Usine a Fonte et le Four Electrique de Choindez, Jura, Suisse. (The Choindez Steel-Melting Plant and Electric Furnace, Jura, Switzerland). *Revue de Métallurgie,* v. 44, Sept.-Oct. 1947, p. 307-318.

Introduction, by H. Fehlmann; History, M. von Anacker; The Choindez Electric, Steel-Melting Plant, by E. Gehring; and Future Prospects for Electric Melting of Iron, by R. Durrer.

16b-51. Portable Cover Sheet Annealing Furnaces. L. G. A. Leonard. *Mettallurgia,* v. 38, May 1948, p. 43-46.

A recent installation for the treatment of silicon-steel sheets for electrical parts.

16b-52. Presidential Address; The Development of the Openhearth Furnace. Andrew McCance. *Iron and Steel,* v. 21. May 13, 1948, p. 198-200, 257.

Mainly historical.

16b-53. Openhearth Furnaces; Construction and Repair Program at Consett. D. C. Muir. *Iron and Steel,* v. 21, May 13, 1948, p. 201-204; discussion p. 263-266.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 481-491. See item 16b-7, 1948.

16b-54. Openhearth Gas Ports; Design in Relation to Efficiency. M. P. Newby. *Iron and Steel,* v. 21, May 13 1948, p. 205-207; discussion, p. 263-266.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 601-608. See item 16b-8, 1948.

16b-55. Steel-Mill Boilers Designed for Blast-Furnace Gas. W. M. Cline, Jr. *Power,* v. 92, June 1948, p. 84-85, 140.

16b-56. Fonctionnement des Régénerateurs et Cowpers en Accumulateurs de Chaleur. (Operation of Regenerators and Cowper's Stoves as Heat Accumulators.) Jean Szczeniowski. *Revue de Métallurgie,* v. 44, Nov.-Dec. 1947, p. 321-329.

After thorough experimental and theoretical investigation, it was concluded that such equipment in its present form is outmoded. This conclusion is based on new techniques using oxygen-enriched air not requiring preheating or a combustion turbine.

16b-57. Some Gas Applications in Steel Mills. H. H. Feirabend. *Industrial Gas,* v. 26, May 1948, p. 8-9, 20-21.

Applications to such operations as continuous bright gas normalizing of strip steel, continuous bright gas annealing of strip steel, one-way-fired soaking pits, atmosphere annealing covers, gas carbon restoration, gas quenching, gas pickling and continuous high-temperature (2500°) roller-hearth furnaces.

16b-58. Presidential Address; the Development of the Openhearth Furnace. Andrew McCance. *Journal of the Iron and Steel Institute,* v. 159, May 1948, p. 1-10.

Mainly historical.

16b-59. Iron and Steel Institute Presidential Address: the Development of the Openhearth Furnace. Andrew McCance. *British Steelmaker,* v. 14, June 1948, p. 263-271.

16b-60. Precision Heat Treating Performed at Rochester Division of Lindberg Steel Treating Co. Part II. *Industrial Heating,* v. 15, June 1948, p. 1039-1040, 1042, 1044, 1046, 1078.

Pot, annealing, brazing, and induction furnaces; martempering bath; gas generators; and all auxiliaries. Inspection, cleaning and surface preparation, welding, and materials handling.

16b-61. Experimental Furnaces of the British Iron and Steel Research Association (B.I.S.R.A.). Max Davies. *British Science News,* v. 1, 1948, p. 2-5.

A blast furnace and an openhearth furnace and the experiments being conducted with them.

16b-62. Cubilos Com ar Quente. (Cupola Furnaces With a Hot Blast.) Mauricio Novinsky. *Boletim da Associacao Brasileira de Metais,* v. 4, April 1948, p. 164-172.

The recuperation of heat in cupola furnaces studied from the point of view of coke conservation. Suitability of different types of cupola furnaces for use in Brazil.

16b-63. The Development of the Open-Hearth Furnace. Andrew McCance. *Engineering,* v. 165, May 21, 1948, p. 499; May 28, 1948, p. 526-527. A condensation.

Previously abstracted from *Iron and Steel,* v. 21, May 13, 1948, p. 198-200, 257.

16b-64. Blast-Furnace Stoves; Improved Design With Offset Combustion Chamber. J. E. MacDonald and John P. Marron. *Iron and Steel,* v. 21, June 1948, p. 295-296.

16b-65. Potentialities of the Pressure Blast Furnace. B. S. Old and E. R. Poor. *Mining and Metallurgy,* v. 29, July 1948, p. 385-387.

Test results which indicate that a notable increase is possible in

pig-iron output with minimum expenditure.

16b-66. Melting Furnaces in German Steel Foundries. Hans Stein and Karl Roesch. *Metallurgia,* v. 38, June 1948, p. 85-89.

Trends in construction and use of various types.

16b-67. The Maintenance of Blast-Furnace and Ancillary Plant. Arthur Bridge. *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 193-204.

16b-68. The Application of Fuel Oil and Surplus Gas at an Integrated Iron and Steel Works. *Journal of the Institute of Fuel,* v. 21, June 1948, p. 254-258.

Appendix and discussion of a paper by J. Sinclair Kerr. (April issue).

16b-69. Hardening With Atmospheres From Standard Raw Gas. J. G. Hoop. *Steel Processing,* v. 34, July 1948, p. 362-365.

Controlled-atmosphere generators, heat treating furnaces, and "carbon-potential indicator" used to assist in adjustment of the generators and to determine protective-atmosphere quality.

16b-70. Steel Making, Heating and Heat Treating Furnaces at the Kaiser Fontana Plant: II. *Industrial Heating,* v. 15, July 1948, p. 1114-1118, 1120, 1158.

The structural mill reheating furnaces, the furnaces serving the merchant mill, flash baking and annealing wire-mill equipment, alloy-steel finishing facilities, and the slow-cooling pit for alloy steels.

16b-71. Electric Arc Melting Furnace Practice Here and Abroad. *Industrial Heating,* v. 15, July 1948, p. 1152, 1154, 1156, 1158. Based on talk by W. B. Wallis.

Previously abstracted from *Journal of the Electrochemical Society,* v. 93, March 1948, p. 46 N-50 N.

16b-72. Elimination of Sulphur in the Blast-Furnace. D. Joyce. *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 291-296.

Production of iron with low sulphur content and how to utilize this content as a guide to furnace conditions.

16b-73. Rotary Hearth Furnaces Find Many Uses in Heating Steel. R. E. Buckholdt. *Blast Furnace and Steel Plant,* v. 36, Aug. 1948, p. 937-941.

Furnace and its adaptability.

16b-74. Oxygen in the Electric Furnace. J. H. Berryman and J. M. Crockett. *Iron Age,* v. 162, Aug. 5, 1948, p. 72-75, 144.

A comprehensive resume of experiences involving the large basic units as well as the 2- to 6-ton foundry acid furnaces.

16b-75. Water-Cooled Cupola Features Duplexing Plant. E. S. Kopecki. *Iron Age,* v. 162, Aug. 19, 1948, p. 81-85.

Description of cupola, and performance data obtained to date. Features unusual tuyere design, increased blast pressure, and resemblance to a miniature blast furnace.

16b-76. Note sur le soufflage de l'hydrogene dans les hauts fourneaux. (Note Concerning the Hydrogen Blast in the Blast Furnace.) J. G. Platon. *Revue de Métallurgie,* v. 45, March-April 1948, p. 118-119.

Calculations on the use of fuel oil (containing about 85% C and 15% H_2) in the blast furnace with resulting savings in coke consumption.

16b-77. Electric Furnaces for the Wire Industry. Part 3. H. J. Tucker and J. A. Monks. *Wire Industry,* v. 15, Aug. 1948, p. 519-520.

Equipment and processes.

16b-78. Electrical Heating of Steel Strip for Continuous Processing. A. R. Ryan and F. E. Ackley. *Iron and Steel Engineer,* v. 25, Aug. 1948, p. 66-78; discussion, p. 78-80.

Electrically heated protective-atmosphere furnaces, resistance furnaces, and induction furnaces all offer interesting possibilities for continuous processing in various departments of the steel plant.

16b-79. Construction of Cable Tool Bit Forges. Ferd J. Spang. *Petroleum Engineer,* v. 19, Aug. 1948, p. 55-56, 61-62.

Method of preparing a forge from oil drums and arranging manner of mixing and burning fuel so that heat will permit the tool bit to be dressed with minimum of effort and slight loss from scaling and burning.

16b-80. Here's a Way to Preheat Castings. Build a Temporary Firebrick Furnace To Do the Job. F. C. Geibig. *Welding Journal,* v. 27, Aug. 1948, p. 591-592.

Steps in building furnace.

16b-81. Rapid Billet Heating With Gas. L. J. Stanbery and J. M. Brennan, *Iron Age,* v. 162, Aug. 26, 1948, p. 82-85.

A newly developed forging billet heating furnace which heats work to 2200 to 2300° F. at a rate of up to 440 pieces per hr. with a minimum of oxidation. Containing a number of unusual design features, including water-cooled skidway rails, the furnace is said to have a normal refractory life. Construction,

heating rates, atmospheres, controls, operating costs and furnace life.

16b-82. Electric Oven Annealing of Malleable Iron Castings. F. W. Jacobs. *Foundry,* v. 76, Sept. 1948, p. 68-73, 129.

Installations and procedure at the Lake City Malleable, Inc., Ashtabula, Ohio.

16b-83. Furnace Brazing Pulleys and Sheaves Cuts Production Costs. T. E. Nelson *Iron Age,* v. 162, Sept. 2, 1948, p. 92-94.

Use of a furnace-brazed assembly for producing a power lawnmower pulley, which results in a reduction in manufacturing costs of 10 cents per part. A description of the furnace and operating costs.

16b-84. Openhearth Fume Control. E. S. Kopecki. *Iron Age,* v. 162, Sept. 9, 1948, p. 78-80.

The openhearth fume problem, heightened by use of the oxygen lance, has recently been solved at Republic by application of a venturi scrubbing unit. Construction and performance of this scrubber, which is already being tested for possible use in conjunction with other steelmaking operations.

16b-85. Describes Electric Furnace Malleablizing Operations. H. R. Cowles. *American Foundryman,* v. 14, Sept. 1948, p. 50-53.

Equipment and procedures at Lake City Malleable Inc., Ashtabula, Ohio.

16b-86. The Present Outlook for Coal. *Industrial Heating,* v. 15, Sept. 1948, p. 1506, 1508, 1510, 1512.

Summarizes three papers on the uses of coal in the steel industry: it and its by-products; uses in other industries now and in the future; and coal in national and international economics. Presented at recent joint meeting of the Engineers' Society of Western Pennsylvania and the A.I.M.E. in Pittsburgh.

16b-87. The Use of Fuel Oil in Furnaces for the Iron and Steel Fabricating Industries. M. Roddan. *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels,* Birmingham Univ., London, Sept. 21-23, 1948, (Advance Copy), 47 pages.

Actual cases of use of oil in furnaces for forging, pin heating, annealing, plate heating, rolling mill, slab reheating, wrought-iron pile reheating, strip heating for conduit welding, iron melting, vitreous enameling, and terne coating. Consumption, efficiencies, and conditions.

16b-88. Les fours de recuit de la malléable. (Annealing Furnaces for Malleable Cast Iron.) Gabriel Joly. *Fonderie,* June 1948, p. 1187-1197.

Different types used for black and whiteheart malleable iron, using coal, gas and electricity, in operation in France and abroad. Details of construction.

16b-89. Vertical Furnaces Reduce Labor Costs 20% in Treating High-Speed Steel Broaches. W. L. Gibbons. *Materials & Methods,* v. 28, Sept. 1948, p. 77-79.

16b-90. Special Furnaces Developed for Producing Hollow Steel Propellers. Richard M. Hortvet. *Iron Age,* v. 162, Sept. 16, 1948, p. 72-79.

Design, construction, and operation of four furnaces developed specifically for processing propellers. Many of the design features of these units represent important departures from normal furnace design and have proved successful in solving some of the problems of atmosphere and temperature control in high-temperature operations.

16b-91. Vyvoj konstrukce Siemens-Martinovych peci. (Developments in Construction of Openhearth Furnaces.) Jiri Alexandrovsky, *Hutnické Listy,* v. 3, March 1948, p. 72-78.

Recommendations to be followed in design of and choice of refractory materials for openhearth furnaces. 15 ref.

16b-92. An Experimental Furnace for the Investigation of Open-Hearth-Furnace Combustion Problems. Part III. Studies With the Maerz Port and Various Modifications Thereof. J. F. Allen and G. Fenton. **Part IV. The Study of Roof Temperatures.** J. H. Cook and A. H. Leckie. *Journal of the Iron and Steel Institute,* v. 160, Sept. 1948, p. 37-56.

The experimental furnace described in Part I was modified to a Maerz design and experiments were conducted under various operating conditions with this and other modified ports. In general the performance obtained with the Maerz port was superior to that obtained with ordinary ports. A new design was found to give exceptionally good results. Part IV gives the influence of furnace operating conditions and port design on average and maximum roof temperature. Little can be done to produce higher heat transfer to the hearth without higher roof temperatures. An effective way to increase heat transfer to the hearth, without damage to the roof, is to increase the uniformity of roof temperature. Various modifi-

cations of port design for this purpose. 16 ref.

16b-93. Effect of Coke Quality on Blast Furnace Iron Tonnage. E. J. Gardner. *Steel,* v. 123, Oct. 4, 1948, p. 94, 96, 98, 116, 119.

Previously abstracted from *American Iron and Steel Institute, Preprint,* 1948, See item 14b-81, 1948.

16b-94. Builds New Blast Furnace in 97 Days. John D. Knox. *Steel,* v. 123, Oct. 4, 1948, p. 101.

Time-saving means of building a new blast furnace on the site of an old one.

16b-95. New Universal Inductor for High Frequency Hardening of Steel. V. V. Alexandrov and S. M. Gamazkov. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 354. Translated and condensed from *Vestnik Machinostroenia* (Bulletin of Machinery Production), v. 2, 1948, p. 43-46.

Apparatus capable of hardening a wide range of shapes and sizes and consisting of a main structure and interchangeable inserts to suit different shapes and sizes of work.

16b-96. Baking the Finish on Automobile Bodies. *Industrial Finishing,* v. 24, Oct. 1948, p. 124.

New Ford oven in which controlled convection and infrared heating are combined.

16b-97. Some Experiences With Soaking Pits. H. V. Flagg. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 59-63; discussion, p. 64-66.

Ten years of development in soaking-pit design and control.

16b-98. Combustion Control. H. Ziebolz. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 67-71.

Control and proportioning systems for use of air-oxygen mixtures in steel mill practice.

16b-99. Determinazione del profilo degli altiforni a coke. (Design of Blast Furnaces Using Coke.) Guido Danese. *La Metallurgia Italiana,* v. 40, March-April 1948, p. 54-70.

Factors involved are investigated from a theoretical point of view. 16 ref.

16b-100. High-Frequency Induction Heating of Steel Rods for Production of Bearing Shells by Stamping. (In Russian.) I. N. Chichilo and V. A. Sudarikov. *Promyshlennaya Energetika* (Industrial Power), v. 5, Aug. 1948, p. 10-11.

Use of high-frequency heating instead of conventional furnace heating to expedite production of bearing shells by the hot stamping process. Includes circuit diagram.

16b-101. Fuel Oil in Furnaces; Use in the Iron and Steel Fabricating Industry. M. Roddan. *Iron and Steel,* v. 21, Oct. 1948, p. 457-460. A condensation.

Previously abstracted from *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels, Advance Copy,* 1948. See item 16b-87, 1948.

16b-102. Considerations in the Design of Alloy Support Mechanisms for Pit Type Furnaces. George C. McCormick. *Industrial Heating,* v. 15, Oct. 1948, p. 1709-1710, 1712, 1714, 1716, 1837-1838.

Design of several types of the above. Several improvements were made to prevent costly failures which had occurred while the devices were supporting parts being heat treated and quenched.

16b-103. New Slab Heating Furnace at Irvin Works. *Iron Age,* v. 162, Nov. 4, 1948, p. 118-120.

New furnace, installed at Irvin Works of Carnegie-Illinois Steel Corp. The unit, which is zone-controlled, triple-fired and continuous, will handle slabs 3 to 8 in. thick, 20 to 60 in. wide, 60 to 216 in. long.

16b-104. A Note on the Varying-Turbulence Cowper Stove; The Denain-Anzin Tests and the C.S.I. Standard Cowper Stove. Daniel Petit. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 131-138.

The two main principles of this blast-furnace stove. Detailed tests on a properly constructed stove are reported, results showing the usual efficiency test to be unsatisfactory and leading to a new and simple method for determining optimum operating conditions. Details of a standard Cowper stove especially designed for use with large-capacity blast furnaces.

16b-105. Tracer Study of Sulphur in the Coke Oven. S. E. Eaton, R. W. Hyde, and B. S. Old. *Metals Technology,* v. 15, Oct. 1948, T.P. 2453, 20 pages.

Details of large scale study made to determine the principal sources of sulphur in coke as a guide in selective purchasing of coal. Small amounts of iron pyrites were prepared from radioactive sulphur, mixed thoroughly with the coal charge of a full-scale coke oven, the mixture coked under normal conditions, and the course of the pyritic sulphur traced. Results show no preferential removal of either of the two forms of sulphur during coking. 13 ref.

16b-106. Gas Control in an Integrated Steelworks. *Coke and Gas.* Oct. 1948, p. 347-353.

At the Corby works of Stewarts and Lloyds Limited the supply of coke-oven and blast-furnace gas to the various departments is centrally supervised in order to coordinate gas production, gas consumption, power supply, and steel production.

16b-107. Gas Carburizing Plant. D. S. Laidler. *Machinery* (London), v. 73, Oct. 28, 1948, p. 608-610.

Advantages of the process. Design of the plant and its operation.

16b-108. Burn Waste Coke in Cupola. W. A. Engelhart and H. W. Arterburn. *American Foundryman,* v. 14, Nov. 1948, p. 59-60.

Briquetting of coke breeze with a Portland cement and lime binder, so it can be used as cupola fuel.

16b-109. Cover Type Annealing Furnaces Speed Production for the Columbia Steel Co. *Industrial Heating,* v. 15, Nov. 1948, p. 1882-1884, 1886, 1888, 1890.

16b-110. Chicago Steel Treating Company Offers Diversified Service: II. (Concluded.) *Industrial Heating,* v. 15, Nov. 1948, p. 1988-1990, 1992, 1994, 1996, 2038.

The general heat treating equipment, including a continuous furnace, a shaker hearth furnace, gas carburizing, semimuffle and tempering furnaces, an induction heater, atmosphere generators, quench tanks, washing machine, surface-finishing equipment, inspection and straightening equipment, materials-handling, and maintenance.

16b-111. Experimental Furnaces of the British Iron and Steel Research Association. Max Davies. *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1332-1334.

Previously abstracted from *British Science News,* v. 1, no. 8, 1948, p. 2-5. See item 16b-61, 1948.

16b-112. Off-Site Blast Furnace Construction. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 105-106.

New scheme utilized to save two months of production time.

16b-113. New Heating Furnaces Boost Forging Output. Herbert Chase. *Iron Age,* v. 162, Nov. 18, 1948, p. 113-116.

Introduction of new rotary hearth furnaces with full automatic controls has increased uniformity of forgings, increased capacity, and saved both space and fuel. Use for various forging jobs.

16b-114. Fuel Oil in Furnaces; Use in the Iron and Steel Fabricating Industry. (Concluded.) M. Roddan. *Iron and Steel,* v. 21, Nov. 1948, p. 493-495.

Previously abstracted from *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels, Advance Copy,* 1948. See item 16b-87, 1948.

16b-115. Alloy Steel Forgings; Cyclic Annealing. *Iron and Steel,* v. 21, Nov. 1948, p. 496.

Process and equipment developed.

16b-116. The Application of the Results of Some Steel Furnace Trials to Glass Furnace Practice. M. W. Thring. *Journal of the Society of Glass Technology* (Transactions Section), v. 32, Aug. 1948, p. 189-208.

While the emphasis in glass-tank research is somewhat different from that in steel furnaces, a study of port design in the latter gave results which can be of interest in the former.

16b-117. Cowper Stoves; The Varying-Turbulence Type and the C.S.I. Standard Stove. Daniel Petit. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 565-568; discussion, p. 584-585.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 131-138. See item 16b-104, 1948.

16b-118. Acid Electric Steel for Castings. Sam F. Carter and C. K. Donoho. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 167-185; discussion, p. 186-190.

Previously abstracted from preprint. See item 2-63, 1947.

16b-119. Blast Furnace Bell Development. Truman H. Kennedy. *Yearbook of the American Iron and Steel Institute,* 1947, p. 113-124.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting New York, May 21-22, 1947.) See item 2-119, 1947.

16c—Nonferrous

16c-1. A New Graphite Resistor Vacuum Furnace and Its Application in Melting Zirconium. W. J. Kroll, C. Travis Anderson, and H. L. Gilbert. *Metals Technology,* v. 15, Jan. 1948, T.P. 2310, 6 pages.

Construction of the above furnace and results obtained with it.

16c-2. Gas-Fired Foundry Equipment Produces Quality Castings. *Industrial Heating,* v. 15, April 1948, p. 604, 606, 608, 610.

16c-3. Use of Coal in Zinc Production. W. M. Peirce. *Mining and Metallurgy,* v. 29, May 1948, p. 286-288.

Coal and coke consumption in the production of metallic zinc, zinc oxide, and in concentration of certain low-grade ores. Processes, furnaces, and retorts used in these operations. Application of natural gas, producer gas, and the qualifications of coals for the various processes. (Presented at annual meeting, A.I.M.E., Feb. 18. 1948.)

16c-4. Reverberatory Melting of Zinc Base Die-Casting Alloys. R. L. Wilcox. *Iron Age,* v. 161, June 10, 1948, p. 80-82.

Use of 18-ton gas-fired furnace which is reported to effect a reduction of 35 to 40% in direct labor and fuel costs, as compared with pot-type units. Oxidation losses are said to range from 0.5 to 1%.

16c-5. Good Housekeeping in a Gun Factory. Arthur Q. Smith. *Industrial Gas,* v. 27, July 1948, p. 8-9.

Gas-fired crucible furnaces, core-drying ovens, and other equipment in the nonferrous foundry.

16c-6. Fuel Factors in Non-Ferrous Fabrication. Leslie Aitchison. *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels,* Birmingham Univ., London. Sept. 21-23, 1948, (Advance Copy) 9 pages.

For a variety of nonferrous metallurgical processes.

16c-7. Conveyor Furnace Anneals Bimetal Strips. C. F. Alban. *American Machinist,* v. 92, Sept. 23, 1948, p. 108-110.

Solution of problems in development of satisfactory furnace and handling equipment, caused by the change of curvature of the strip on heating or cooling. A twin-belt arrangement is used to prevent curling.

16c-8. Automatic Furnace for Soldering Diesel-Electric Commutators. *Iron Age,* v. 162, Oct. 7, 1948, p. 101.

Equipment used by Santa Fe R. R. for repair.

16c-9. Fuel Factors in Non-Ferrous Fabrication. Leslie Aitchison. *Foundry Trade Journal,* v. 85, Oct. 14, 1948, p. 365-366. A condensation.

Previously abstracted from *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels, Advance Copy,* 1948. See item 16c-6, 1948.

16d—Light Metals

16d-1. Furnaces for Heat Treating Aluminum. Owen Lee Mitchell. *Industrial Heating,* v. 15, Feb. 1948, p. 204-206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 348, 350, 352, 354, 356.

The application of industrial heating in the fabrication of the aluminum alloys in the solid state in the various Reynolds Metals plants.

16d-2. Forni ad induzione tipo Bora. (Induction Furnaces of the "Bora" Type.) E. Calamari. *Alluminio,* v. 27, March-April 1948, p. 150-157.

Difficulties in introduction to aluminum industry. Most convenient type of such furnaces.

16d-3. Age Hardening of Aluminum at Boeing Aircraft Co. *Instrumentation,* v. 3, Third Quarter 1948, p. 25.

Large age hardening oven characterized by versatility, close automatic control, and uniformity of oven temperature. System of automatic control.

16d-4. Two-Chamber Induction Melting Furnace Lowers Aluminum Die Casting Cost. Floyd J. Kamin. *Materials & Methods,* v. 28, Sept. 1948, p. 69-72.

Closer control over melting and holding temperatures results in lower rejection rate and increased productivity. Comparative cost data showing increase of only 3c per lb. over the 27c figure for gas.

16d-5. Neuartige elektrische Ofen zum Erschmelzen von Aluminiumabfällen und krätzen. (New Types of Electric Furnaces for Melting Aluminum Scrap.) E. Bertram. *Metall,* Jan. 1948, p. 1-6.

A comparative study of the efficiency and economy of different types of melting furnaces.

SECTION XVII

REFRACTORIES AND FURNACE MATERIALS

17-1. The Development of Basic Insulating Bricks. J. H. Chesters, T. W. Howie, and T. R. Lynam. *Transactions of the British Ceramic Society,* v. 46, Nov. 1947, p. 349-370; discussion, p. 370-377.

Object of the work described was to produce a brick of high porosity suitable for the "all-basic" furnace roof, the advantages being lower initial cost, lower weight per brick, moderate insulating value, and reduced "bursting tendency" when chrome-magnesite batch is used. Four methods were used for obtaining porosity, namely: the addition of foam, combustible material, naphthalene, or of minerals such as raw magnesite which lose weight on firing.

17-2. Carbon—a Blast Furnace Refractory. M. T. Cory and F. B. Thacher. *Blast Furnace and Steel Plant,* v. 35, Dec. 1947, p. 1482-1487.

Properties of carbon refractories for use in the bottoms and linings of blast furnaces. A combination wall of carbon and fireclay brick is recommended over the all-carbon or ceramic hearth. Heat losses and temperature gradients in different types of walls are charted, and design details are diagrammed. (Presented at meeting of Refractories Division, American Ceramic Society, Bedford Springs, Oct. 10, 1947.)

17-3. Ceramic Materials Show Promise for High-Temperature Mechanical Parts. Joseph R. Bressman. *Materials & Methods,* v. 27, Jan. 1948, p. 65-70.

Development of ceramics for use both as solid shapes and as coatings for metals for operating temperatures well above 1500° F.

17-4. Refractories and Forging Costs. H. J. Shaner. *Steel Processing,* v. 34, Jan. 1948, p. 41-43.

Refractories used in the lining of forging furnaces and their effect on forging costs. Benefits derived from use of control equipment and shock absorption devices.

17-5. Drying Stopper Rods at American Steel Foundry. *Industrial Heating,* v. 15, Jan. 1948, p. 112-113.

Rods are covered with a fireclay-bonded graphite sleeve. For every heat, each openhearth ladle must be equipped with a new rod properly heated and dried. Conveyer oven was developed for production-line drying of the rods.

17-6. Design and Performance of a Refractory Recuperator. *Industrial Heating,* v. 15, Jan. 1948, p. 114, 116, 118, 120, 178. Condensed from paper by E. G. Smith.

Performance data for a vertical-fired, ingot heating furnace equipped with integrated refractory recuperators. Air preheated by the waste gases is mixed with gas and burns at a vertical burner in the center of the furnace. Waste gas escapes at both sides through the recuperator system. Possibilities of the recuperative openhearth. (Presented at annual meeting of A.I.S.E., Pittsburgh.)

17-7. Ceramic Glazes for Combustion Chamber Linings in Gas Turbines. *Industrial Heating,* v. 15, Jan. 1948, p. 122, 124. Condensed from paper by Louis Navais presented at General Electric Science Forum.

17-8. The Development of Refractories for High-Temperature Industrial Processes. A. Hilliard and J. H. McKee. *British Coal Utilization Research Association Monthly Bulletin,* v. 11, Nov. 1947, p. 457-468.

A review. 118 ref.

17-9. Clays—Deflocculation and Casting Control. Part VII—Determination of Soluble Impurities in Slip Ingredients. G. W. Phelps. *Ceramic Age,* v. 51, Jan. 1948, p. 9-11.

Sources of trouble-making ions and practical methods of detecting these.

17-10. Oxygen Firing Furnaces of Industry Is Placing New Demands on

Refractories. *Brick & Clay Record,* v. 112, Jan. 1948, p. 56.

17-11. Some of the Refractory Problems Faced in Research on Jet Propulsion Units. *Brick & Clay Record,* v. 112, Jan. 1948, p. 58, 60.

17-12. Atomic Energy for Industry Will Pose Intricate Problems for Refractories. *Brick & Clay Record,* v. 112, Jan. 1948, p. 62, 64.

17-13. Preparedness Marks Refractories Manufacturers Entry Into New Era. *Brick & Clay Record,* v. 112, Jan. 1948, p. 66, 68, 70, 72, 74, 76, 78, 80.

Various new developments.

17-14. Operating With a Basic Main Roof. A. K. Moore. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 86-88.

Results obtained at Steel Company of Canada, Ltd., Hamilton, Ontario, including those with different design arrangements.

17-15. 38th Report of the Refractory Materials Joint Committee. The Behavior of Firebricks on Reheating. Summary, *Gas Times,* v. 54, Jan. 2, 1948, p. 53-54; discussion, p. 54, 56-57.

17-16. Observations on the Shelling of Checker-Brick. E. C. Petrie and D. P. Brown. *Journal of the American Ceramic Society,* v. 31, Jan. 1, 1948, p. 14-20.

Brick installed in glass-tank checkers, and removed, cleaned, and returned to service at higher operating temperatures, showed excessive bloating and shelling; checker bricks from openhearth checkers were affected in a similar manner. Chemical analyses indicated that pickup of excessive alkalis may be responsible.

17-17. Experiments With Explosives for Opening Furnace Tap Holes. *Steel,* v. 122, Feb. 16, 1948, p. 107, 110.

Besides the paper referred to in the title, which was presented by John R. Barnes of Republic Steel, several other papers presented at annual winter meeting of Eastern States Blast Furnace and Coke Oven Association, Pittsburgh, Feb. 6, 1948, are reviewed. Subjects covered include blast-furnace lining disintegration, carbon hearths, and top and bottom burning of tuyeres.

17-18. Safer Blast Furnace Lining. *Business Week,* Feb. 14, 1948, p. 70-71.

Interlake Iron Corp. installs new type of carbon-block hearth that prevents molten metal from eating through furnace. It is also faster to install, permits better insulation against heat loss.

17-19. Ceramic Materials for Some Special Applications. B. C. Weber. *Headquarters Air Materiel Command, Wright Field, Technical Report No. F-TR-1163-ND,* Feb. 1948, 5 pages.

Brief report on electroceramics for high-voltage service, examples of ceramic masses and their properties, and ceramic material for turbine blades.

17-20. A Design for Blast Furnace Hearths. W. S. Unger. *Yearbook of the American Iron and Steel Institute,* 1947, p. 95-112.

Good hearth design and two corollaries: proper selection of materials for construction, and careful and intelligent operation.

17-21. Introduction to Study of the Refractory Oxides. *Industrial Heating,* v. 15, Feb. 1948, p. 300, 302. Condensed from paper by Raymond E. Birch.

The refractoriness of several oxides which might offer possibilities for refractory use, as well as methods of determining this property. (Presented at recent autumn meeting of refractories division, American Ceramic Society.)

17-22. Simple Oxide Porcelains for Jet Planes and Projectiles. *Industrial Heating,* v. 15, Feb. 1948, p. 304, 306.

Summarizes paper by R. F. Geller of the National Bureau of Standards. (Presented at Autumn meeting of refractories division, American Ceramic Society.)

17-23. Mullite and Al_2O_3 Refractories. *Metal Progress,* v. 53, Feb. 1948, p. 279-280. Condensed from "Properties and Uses of Mullite and Pure Alumina Refractories", by G. B. Remmey.

Results of experimental work at temperatures from 3100 to 3500° F. on 12 compositions. Physical appearance of the samples after exposure to each of five temperatures. The 99% alumina and the "vitrified" alumina (98%) remained in good condition at 3500° F.

17-24. Economic Considerations for Stack Lining Repairs. W. R. Trognitz. *Steel,* v. 122, March 1, 1948, p. 110, 112.

Coke savings over a five-month period resulting from replacement of 24 ft. of brickwork above the mantel, more than paid over-all repair cost, and permitted detailed inspection of refractories and an increase in production. Details of the repair program. (Presented at Annual Winter Meeting of Eastern States Blast Furnace and Coke Oven Assoc., Pittsburgh, Feb. 6, 1948.)

17-25. Economic Considerations for Stack Lining Repairs. W. R. Trognitz. *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 322-324.

Consideration of the various factors involved indicates that, under

certain conditions, it is economically sound to repair blast-furnace linings after an initial operating period of 1600 days or more, although complete or partial failure has not made lining mandatory. (Presented at meeting of Eastern State Blast Furnace and Coke Oven Assoc., Feb. 6, 1948.)

17-26. High-Temperature Ceramics. E. L. Olcott. *Product Engineering,* v. 19, March 1948, p. 110-112.

The present state of development of high-temperature ceramics. Types of ceramics, physical characteristics, and molding methods.

17-27. Physical Changes in Re-Pressing of Refractories. *Industrial Heating,* v. 15, Feb. 1948, p. 308. Based on paper by J. O. Everhart, *Journal of the American Ceramic Society,* v. 30, Nov. 1, 1947, p. 345-348.

Presented at annual meeting of American Ceramic Society, Atlantic City.

17-28. Ceramic Developments for Aircraft Power Plants. Winston H. Duckworth. *American Ceramic Society Bulletin,* v. 27, March 15, 1948, p. 93-95.

Research program of the Air Materiel Command directed toward development of refractory ceramic materials for high-temperature applications.

17-29. Life of Ladle and Spout Linings Increased With Graphite Base Refractory. *Steel,* v. 122, April 5, 1948, p. 88, 115-116.

Advantages of this refractory.

17-30. Basic Ends and All-Basic Openhearth Furnaces. R. P. Heuer and Mervin A. Fay. *Iron and Steel Engineer,* v. 25, March 1948, p. 47-58; discussion, p. 58-60.

Use of basic ends on openhearth furnaces indicates savings of the order of 10 to 25 cents per ton. Use of the all-basic furnace, although experimental at present, indicates that further savings are possible. (Presented at A.I.S.E. Detroit District Section Meeting, Nov. 11, 1947.)

17-31. Investigation of the Process of Compression Shrinkage of Single-Phase Metal-Ceramic Bodies. Part I. Part II. Relationship Between Initial and Final Densities Resulting From Constancy of the Relative Decrease in Pore Volume. (In Russian.) V. A. Ivensen. *Zhurnal Tekhnickeskoi Fiziki* (Journal of Technical Physics), v. 17, Nov. 1947, p. 1301-1320.

Volume decrease under pressure is shown to take place along with a proportional decrease in pore volume in bodies of the same composition, sintered under similar conditions. This relationship is shown to be independent of initial porosity. In Part II, the coefficient of relative pore-volume decrease determined for a specific powdered metal and specific sintering conditions is shown to be a universal indicator of shrinkage.

17-32. The Changes Occurring in Blast-Furnace Stove Refractories During Service. J. Mackenzie. *Transactions of the British Ceramic Society,* v. 47, March 1948, p. 91-105; discussion, p. 105-107.

An examination of various brands of refractories was made during two years' service in a hot-blast stove. Extent of vitrification and relationship between vitrification and thermal-shock resistance were followed by measuring variations in rigidity of the specimens during use. The ideal material seems to be a hard-fired, high-alumina brick having superior resistance to slag and vitrification, and therefore less likely to change its rigidity in use and thus set up stresses in the refractory between the vitrified and unvitrified portions.

17-33. The Properties of Blast Furnace Tapping Hole Refractories. L. L. Wells, Jr. *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 451-454.

Results of research on various clays and on properties of the products. (Presented before the Blast Furnace and Coke Assoc. of the Chicago District, Nov. 21, 1947.)

17-34. Larger Carbon Blocks for Blast Furnace Linings Reduce Cost of Installation. *Steel,* v. 122, April 12, 1948, p. 101.

17-35. The Development of Refractories for High-Temperature Industrial Processes. A. Hilliard and F. H. McKee. *Refractories Journal,* v. 24, March 1948, p. 98-105.

Previously abstracted from *British Coal Utilisation Research Association Monthly Bulletin,* v. 11, Nov. 1947, p. 457-468. (To be continued.) See item 17-8, 1948.

17-36. Economic Considerations for Stack Lining Repairs. *Industrial Heating,* v. 15, April 1948, p. 664, 666. Condensed from paper by W. R. Trognitz.

Previously abstracted from *Steel,* v. 122, March 1, 1948, p. 110, 112. See item 17-24, 1948.

17-37. Testing Refractories for the Foundry. S. M. Swain. *American Foundrymen's Association, Preprint* No. 48-26, 1948, 14 pages.

Planning, selection of objectives, justification of costs, and safety fac-

tors for a testing program. Detailed recommendations are made for sampling brick and other refractory materials. Three general types of testing programs and recommendations for small and large foundries. 47 ref.

17-38. A Program for Reducing Bottom Troubles on Basic Openhearth Furnaces. R. Russell Fayles. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 43-52.

Causes of trouble and recommended procedures for maintenance and selection of refractories.

17-39. Performance of Silica Brick. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 202-204.

K. D. Bartels deals with experience with split roofs, effect of size variations in service, and fantail difficulties. Information also by Adam Lilly and M. F. Yarotsky.

17-40. Performance of Basic Brick. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 204-205.

Experiences with insulating basic brick, by G. H. Johnson; and brief comments by Adam Lilly.

17-41. Basic Ends and Basic Roofs. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 206-210.

Three short papers by A. K. Moore, C. R. FonDersmith, and W. J. Rielly dealing with experiences in maintenance, repair, and design.

17-42. Basic Rammed Doors. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 210-214.

Four brief contributions by C. W. Drabers, L. R. Berner, H. E. Warren, and G. H. Johnston (who outlines experiences with metal-clad brick doors).

17-43. Trends in Bottom Construction. John Topping and A. W. Robinson. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 214-217.

Results of a questionnaire survey.

17-44. Comparison of Tests for Bulk Density of Fired Ramming Materials, and a Description of a Test for Magnesite-Slag Mixes. R. B. Snow and C. E. Sumpter. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 217-221.

Results of tests, which are still in the development stage, are described in order to stimulate further investigation and thought on the testing of coarse-aggregate mixes, which, it is believed, are not adequately covered by existing A.S.T.M. specifications.

17-45. Air-Chamber Checkers. B. L. Dorsey. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 222-224.

Construction and average life in five furnaces (four tilters, and one stationary).

17-46. Size Variation in Checker Brick and Its Effect on Openhearth Checker Life. J. A. Pierce. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 225-229; discussion, p. 229-230.

Difficulties caused by variations in dimensions of bricks obtained from the same and from different manufacturers. Recommends that the manufacturers try to achieve a more closely standardized product.

17-47. Mixer Linings. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 30, 1947, p. 230-233.

John Hazel, J. P. L. McMahon, and K. D. Bartels describe their experiences with different materials and designs of metal mixers.

17-48. Recent Developments in Refractories. H. M. Kraner. *Iron and Steel Engineer,* v. 25, April 1948, p. 59-64; discussion, p. 64.

Trends are toward greater use of carbon hearths in blast furnaces, superduty brick, basic-end furnaces, and openhearth bottoms of magnesite brick with a layer of sintered magnesite on top. (Presented at A.I.S.E. Buffalo District Section Meeting, Jan. 14, 1947.)

17-49. The Openhearth Furnace—Making the Most of Silica Roofs. J. H. Chesters. *Iron Age,* v. 161, April 29, 1948, p. 72-77; May 6, 1948, p. 86-93.

Methods for improving performance of silica bricks. Causes and prevention of spalling. Various furnace construction and operation features and their effect on roof life.

17-50. Ceramics, Refractories, and Cements, S. W. Ratcliffe. *Reports of the Progress of Applied Chemistry,* v. 31, 1946, p. 253-270.

A review. 95 ref.

17-51. The Changes Occurring in Blast-Furnace Stove Refractories During Service. J. Mackenzie. *Refractories Journal,* v. 24, April 1948, p. 115-123.

A condensation.

17-52. The Development of Refractories for High-Temperature Industrial Processes. (Concluded.) A. Hilliard and J. H. McKee. *Refractories Journal* v. 24, April 1948, p. 134-138.

Previously abstracted from *British Coal Utilisation Research Association Monthly Bulletin,* v. 11, Nov. 1947, p. 457-468. See item 17-8, 1948.

17-53. The Manufacture of Refractories and Information Concerning Their Use in the Iron and Steel Industry of Western Germany. (Continued.) *Refractories Journal,* v. 24, April 1948, p. 151-153. Reprinted from F.I.A.T. Final Report No. 432.

(To be continued.)

17-54. Modern Refractories for Open-hearth Furnace Bottoms Highly Resistant to Hydration. *Industrial Heating,* v. 15, May 1948, p. 842, 844, 846.

Considerable progress has been made in the manufacture of refractories that resist slaking during long shutdown periods and in improvement of bonding qualities and in freedom from disintegration and hydration.

17-55. Refractory Properties of Domestic Sillimanite. *Industrial Heating,* v. 15, May 1948, p. 848. Based on paper by T. N. McVay, W. A. Hull, and Hewitt Wilson, presented at 49th Annual Meeting, American Ceramic Society, Atlantic City.

Refractory properties of beneficiated schists from South Carolina and Georgia which formed concentrates containing 90% or more sillimanite.

17-56. Recommandations Relatives a l'Emploi des Creusets dans les Fours de Fusion des Bronze et des Laitons. (Recommendations Concerning the Use of Crucibles in Bronze and Brass Melting Furnaces.) Georges Blanc and Pierre Nicolas. *Fonderie,* Jan. 1948, p. 1022-1029.

Methods for manufacture of crucibles and for recovery of the crucible materials.

17-57. I Materiali Refrattari per il Rivestimento Degli Alti Forni. (Refractory Materials for Lining of Blast Furnaces.) Luigi Pompei. *La Metallurgia Italiana,* v. 39, Nov.-Dec. 1947, p. 281-284.

Chemical compositions, thermal and mechanical resistances, and applications of different types.

17-58. An Examination of Blast-Furnace Scaffolds and Scaffold-Forming Materials. J. H. Chesters, I. M. D. Halliday, and J. Mackenzie. *Journal of the Iron and Steel Institute,* v. 159, May 1948, p. 23-36.

Results of a preliminary examination of the materials deposited on the internal surfaces of blast-furnace stacks. Trial of carbon bricks to reduce scaffolding is recommended.

17-59. Factors in Service Behavior of Silica Brick. L. A. Smith. *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 701-706.

Factors related to raw materials, manufacturing processes, and other aspects of brick as such; factors having to do with furnace designs, bricklaying practices and mortars used, and factors incident to service use.

17-60. Armco Relines Blast Furnace in 33 Days. *Iron Age,* v. 161, June 10, 1948, p. 94.

Bricks of fused alumina and zirconia were used in place of the usual steel stock line.

17-61. The CaO-MgO-Cr_2O_3 Ternary System. Part I. A Partial Investigation of the CaO-Cr_2O_3 System. W. F. Ford and W. J. Rees. *Transactions of the British Ceramic Society,* v. 47, June 1948, p. 207-231.

Experimental procedures for determining the nature of the system as an aid in manufacture of refractory materials, as well as to clarify the constitution of slags obtained in working chromium steel.

17-62. Refractories Use With Oxygen Firing Still Offers Problems to Steelmakers. *Brick and Clay Record,* v. 112, June 1948, p. 66, 68.

Problems and results of using oxygen in respect to refractory life.

17-63. Refractory and Heat Resistant Concrete. S. B. MacDonald. *Steel Processing,* v. 34, June 1948, p. 318.

Properties and applications.

17-64. Steel Mill Refractories. *Industrial Heating,* v. 15, June 1948, p. 1028, 1030, 1032, 1034. Based on paper by L. A. Smith.

Uses of refractories in several typical steelmill applications.

17-65. Lightweight Firebrick Lining for Large Rotary Hearth Furnace. *Industrial Heating,* v. 15, June 1948, p. 1036, 1038.

The first use of lightweight insulating firebrick instead of heavy firebrick in a large rotary-hearth furnace has resulted in substantial

fuel economies and saving in time and maintenance.

17-66. Soluble Silicates and the Refractories Industry. H. L. Bolton. *American Ceramic Society Bulletin,* v. 27, June 15, 1948, p. 229-234.

Properties and applications. 48 ref.

17-67. Considerations in the Use of Carbon Refractories in the Blast Furnace. W. S. Debenham. *Steel,* v. 123, July 12, 1948, p. 110, 113, 124, 127, 128, 130.

17-68. Basic Brick in the Open Hearth Furnace. Vernon W. Jones. *Blast Furnace and Steel Plant,* v. 36, July 1948, p. 813-816.

Developments in the sloping backwall and chemically bonded magnesite brick and chrome-magnesia brick. Suspended construction and its advantages.

17-69. The Testing of Silica Bricks for Service in Open-Hearth Furnace Roofs. C. H. Bacon. *Transactions of the British Ceramic Society,* v. 47, July 1948, p. 233-251; discussion, p. 252-258.

Since the roof usually decides the length of the campaign between repairs, any improvement is of vital importance. Laboratory tests adopted for silica bricks show wide variation over a period. An attempt has been made to correlate test results on sample bricks with the service obtained in the furnace. A method of photographing furnace roofs at intervals during their lives.

17-70. Permeability Data on American Refractories. D. O. McCreight. *American Ceramic Society Bulletin,* v. 27, July 15, 1948, p. 257-262.

Previously abstracted from condensed version in *Industrial Heating* v. 14, Oct. 1947, p. 1734, 1736, 1738, 1740. See also 17-89, 1947.

17-71. Some Considerations in the Use of Carbon Refractories in Blast Furnaces. W. S. Debenham. *Ceramic Age,* v. 52, July 1948, p. 24-26. A condensation.

Previously abstracted from *Steel,* v. 123, July 12, 1948, p. 110, 113, 124, 127-128, 130. Item 17-67, 1948.

17-72. Recent Trends in the Ceramic Industry. *Chemical Engineering,* v. 55, July 1948, p. 127-134.

Trends in porcelain enamel, electrical porcelain, china tableware, glass, chemical ware, structural clay products, refractories, and sanitary ware.

17-73. Effect of Gas Atmospheres on Furnace Heat Losses. G. C. Nonken. *Steel Processing,* v. 34, July 1948, p. 377-381.

Since published data on thermal conductivity of insulating materials and refractories was collected with the pores filled with air, measurements were made using several other atmospheres often encountered in practice. Comparisons were made between measured and calculated thermal-conductivity values and the effects of gas atmospheres on total heat loss from typical furnaces were determined. Thermal conductivity, when filled with hydrogen, may be as much as three times the value when filled with air. It was also found that heat losses are greatly increased.

17-74. Investigation of Abrasion Resistance of Various Refractories. Kenneth A. Baab and Hobart M. Kraner. *Industrial Heating,* v. 15, July 1948, p. 1206, 1208. A condensation.

Test method and results obtained on 23 brands of brick for abrasion resistance, as well as modulus of rupture, apparent porosity, and bulk specific gravity. Sixteen brands of fireclay brick were also given a rattler test.

17-75. Carbon as a Refractory Material. *Industrial Heating,* v. 15, July 1948, p. 1214, 1216. Condensed from paper by F. B. Thatcher.

The history of the use of carbon in blast-furnace hearths and its advantages.

17-76. High Temperature Ceramic and Cermet Materials. A. L. Berger, *Enamelist,* v. 25, July 1948, p. 38-39, 42-48.

Recent developments, especially for use in various types of prime movers; also research sponsored by the U. S. Army's Air Materiel Command at the various institutes and colleges. Melting point and stability of high-melting metal-base compounds; and physical and chemical properties of 10 ceramic refractories.

17-77. Mechanism of Nozzle Erosion in Open Hearth Ladles. R. B. Snow and James A. Shea. *Steel,* v. 123, July 26, 1948, p. 88, 91, 94.

Results of experiments made to determine the above and also the relationships, of grade of steel, temperature, composition and physical characteristics of the nozzle material, and temperature of firing of the nozzle material to amount of enlargement of the bore.

17-78. Carbon Brick Tank Linings Used for Pickling Stainless Steels. *Steel,* v. 123, Aug. 2, 1948, p. 101, 104, 106.

Material has proved to be unaffected by HNO_3 and HF at concentrations and temperatures needed for proper pickling. Maintenance problems are outlined.

17-79. Qualites des differents pises francais actuels compares a certains produits etrangers. (Properties of Different French Furnace-Lining Materials as Compared With Certain Foreign Products.) Pierre Nicolas. *Fonderie,* v. 28, April 1948, p. 1124-1132.

Physical and chemical analysis, heat resistance, and resistance to corrosion under operating conditions of various refractory materials from Germany, Belgium, and France. Results indicate that the French materials are just as good as the foreign ones.

17-80. Chemical and Mineralogical Changes in Stack and Hearth Refractories of a Blast Furnace. L. H. Van Vlack. *Journal of the American Ceramic Society,* v. 31, Aug. 1948, p. 220-235.

Refractory samples removed from the lining of a blast furnace exhibiting normal behavior were analyzed for chemical and mineralogical changes. The changes observed in the lining of this furnace and their probable effect upon the refractory life. Suggestions regarding blast-furnace refractory practice. 24 ref.

17-81. Permanente Metals Corporation Making Refractories History on West Coast. *Brick & Clay Record,* v. 113, Aug. 1948, p. 66, 68, 70.

Development of a material for special high-temperature applications that will withstand a load of 25 psi. up to a temperature of 4000° F. without shearing.

17-82. Sonic Method for Measurement of Young's Modulus of Elasticity of Refractories. Kenneth A. Baab and Hobart M. Kraner. *Industrial Heating,* v. 15, Sept. 1948, p. 1580, 1582. A condensation.

Method was applied to 21 samples. Each sample was then tested for modulus of rupture, bulk, specific gravity, true specific gravity and true and apparent porosity, using standard A.S.T.M. methods; and results were plotted against cone-firing temperatures.

17-83. Fabrication et mise en oeuvre des briques de silice pour voute de four Martin. (Production of Silica Bricks and Their Applications for Facing Openhearth Furnaces.) Edouard Deleval. *Revue de Métallurgie,* v. 45, May-June 1948, p. 160-170.

Method of production, composition, and physical and chemical properties of silica bricks. Influence of these factors on service life.

17-84. Refractory Materials in the Foundry Industry. G. R. Rigby and A. T. Green. *Foundry Trade Journal,* v. 85, Sept. 2, 1948, p. 215-221; discussion, p. 221-223.

Relations between constitution, quality, and service life. Phase diagrams, packing density, precautions for rammed linings, action of ferrous oxide slags, methods of testing, relation between viscosity and atomic structure, value of basic refractories, and mechanism of slag attack. 11 ref.

17-85. Reactions of Molten Titanium With Certain Refractory Oxides. Porter H. Brace. *Journal of the Electrochemical Society,* v. 94, Oct. 1948, p. 170-176.

Ti was melted in vacuo in contact with Al_2O_3, BeO, and ThO_2, respectively. The metal reacted vigorously with Al_2O_3, less so with BeO, and slightly with ThO_2. Qualitatively, the relative positions of the oxides on the scale of reactivity with titanium are consistent with the oxygen-dissociation pressures as calculated from thermochemical data. Of the three oxides studied, only thorium oxide showed any promise as a crucible material for melting Ti or Ti-base alloys.

17-86. Reduces Annealing Cycle; Malleable Foundry Develops Insulation Method. Utley W. Smith. *American Foundryman,* v. 14, Oct. 1948, p. 52-53.

Replacement of heavy firebrick backed by calcined diatomaceous brick with light insulating brick backed by courses of diatomaceous silica and 85% magnesia insulating blocks doubled capacity by reducing annealing and firing times.

17-87. Interlake Iron Corp. Uses Carbon-Block Hearth Blast Furnace. *Skillings Mining Review,* v. 37, Oct. 16, 1948, p. 1, 4.

Installation which has been in operation for almost three years. Subsequently three other furnaces have been so equipped, with some changes in design.

17-88. New Heat-Resistant Materials That Slash Process Costs. *Modern Industry,* v. 16, Oct. 15, 1948, p. 40, 42-45.

New refractories and new methods for improvement of old ones, as used in miscellaneous chemical and metallurgical processing units. Comparative data on new and old refractories.

17-89. How Ford Fixes Furnaces Faster. *Modern Industry,* v. 16, Oct. 15, 1948, p. 41.

Use of castable refractories which resist temperatures of 3000 to 3100° F.

17-90. Composition and Structure of Stalactites Formed Under Dinas Roofs of Openhearth Furnaces. (In Russian.) V. A. Bron. *Doklady Aka-*

demii Nauk SSSR (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 125-127.

(Dinas is a type of silica refractory.)

17-91. An Untapped Refractories Market Lies in Ceramic Molds for Precision Casting. *Brick & Clay Record,* v. 113, Nov. 1948, p. 58, 60.

Need for this development.

17-92. Factors in Service Behavior of Silica Brick. L. A. Smith. *Industrial Heating,* v. 15, Sept. 1948, p. 1572, 1574, 1576, 1578; Oct. 1948, p. 1800, 1802; Nov. 1948, p. 1980, 1982, 1984, 1986, 2034, 2036, 2038.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 701-706. See item 17-59, 1948.

17-93. Recent Developments in Refractories and Their Applications. W. F. Rochow and C. A. Brashares. *Chemical Engineering Progress* (Transactions Section), v. 44, Nov. 1948, p. 869-872.

Especially for high-temperature applications.

17-94. Pure Oxide Heavy Refractories. O. J. Whittemore, Jr. *Chemical Enginerring Progress* (Transactions Section), v. 44, Nov. 1948, p. 872-874; discussion, p. 875.

Properties of new alumina, magnesia, and stabilized zirconia refractories. These properties indicate that refractories of this type can be used to line industrial furnaces for operation at very high temperatures.

17-95. Zircon and Zirconia Refractories. W. J. Baldwin. *Chemical Engineering Progress,* (Transactions Section), v. 44, Nov. 1948, p. 875-878.

Properties and present and potential applications. 18 ref.

17-96. Investigation of Abrasion Resistance of Various Refractories. Kenneth A. Baab and Hobart M. Kraner. *Journal of American Ceramic Society,* v. 31, Nov. 1, 1948, p. 293-298.

See abstract of condensed version in *Industrial Heating,* v. 15, July 1948, p. 1206, 1208. See item 17-74, 1948.

17-97. An Evaluation of Basic Brick in the Open Hearth. Vernon W. Jones. *Steel,* v. 123, Nov. 22, 1948, p. 91, 94, 97-98.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 36, July, 1948, p. 813-816. See item 17-68, 1948.

17-98. High-Temperature Ceramic Materials. A. L. Berger. *Technical Data Digest,* v. 13, Dec. 1, 1948, p. 13-18.

Properties and problems in connection with applications to aircraft power plants, jets, rockets, guided missiles, supersonic air foils. Research program of Air Materiel Command being conducted at five universities and colleges and two research institutes. Physical and chemical properties of high-melting ceramic and metal compositions.

17-99. Fundamental Research For the Navy in Ceramics. R. D. Jackel. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 552-564.

Work on the phase relationships of metal-ceramic combinations.

17-100. Pure Oxide Refractories Withstand High Temperatures. O. J. Whittemore, Jr., *Materials & Methods,* v. 28, Dec. 1948, p. 79-81.

Properties and present and patented applications.

17-101. Sulla determinazione del coefficiente di conducibilita termica interna. (Determination of the Coefficient of Internal Thermal Conductivity.) M. Macola. *La Metallurgia Italiana,* v. 39, Jan.-Feb. 1947, p. 12-14.

After a short review of the phenomenon, a method and apparatus particularly adapted to refractory materials on a commercial scale is described.

17-102. Special Refractories for Metal Melting. William H. Henson. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 395-402; discussion, p. 402-404.

Appeared as preprint 47-40. Previously abstracted from *American Foundryman,* v. 11, May 1947, p. 64-70. See item 17-53, 1947.

SECTION XVIII

HEAT TREATMENT

18a—General

18a-1. Heat Treating. *Steel,* v. 122, Jan. 5, 1948, p. 225-226, 228, 232-233.

Brief reviews of new developments: Induction Heating and Melting Out of Special Jobs Category, by R. N. Blakeslee; Convection Heating Used to Cut Annealing Period, by J. L. Whitten; Automatic Conveying Promotes Mass-Production Heat Treating, by Haig Solakian; Salt Bath Furnace Installed to Anneal Gear Blanks, by R. H. McCarroll; Hardenability Practical Aid in Productive Heat Treating, by A. Neudoerffer; Prepared Gas Atmospheres Widely Used in Heat Treating, by T. A. Frischman; Suspended Carburization Now Standard Procedure, by S. L. Widrig; Large Welded Structures Are Low-Temperature Stress Relieved, by T. W. Greene; Application of Salt Baths to Steel Treating Increased, by C. R. Foreman; Wrought High-Temperature Alloys Find Many Uses in Heat Treating, by E. V. Ivanso; Electric Heat Treating Units Make Gains During Past Year, by R. M. Cherry; Future Possibilities Seen for Homogeneous Carburization, by E. G. de Coriolis; Flame Hardening Increases Endurance Limits of Metals, by H. V. Inskeep; Refinements Continued in Furnace Atmosphere Controls, by Willard Roth; Important Strides Made in Induction Heating Practices, by T. H. Gray; Scope of Electric Heat Treatment Is Broadened, by John P. Zur; Full Meaning of Carbo-Nitriding Not Yet Completely Realized, by W. H. Holcroft; Increased Use of Induction Heating for Forging Predicted, by W. E. Benninghoff; Improved Processing Methods Vital to Metal Industries, by Frederic O. Hess; Development Serves to Perfect Liquid Carburizing Baths, by D. J. Richards.

18a-2. Salt Descaling Baths. Horace Drever. *Industrial Heating,* v. 15, Jan. 1948, p. 40, 42, 44, 46, 48, 50, 52, 166, 168.

Two types serve to illustrate the significant differences between all processes. These are the sodium hydride and the sodium hydroxide processes. The methods are useful for both ferrous and nonferrous metals.

18a-3. Control of Heat Treatment—I. A. H. Koch. *Industrial Heating,* v. 15, Jan. 1948, p. 66, 68, 70, 72, 74, 113.

Developments in heat treating and metallurgy which resulted in present processes; methods, types, limitations, and accomplishments of temperature control; importance of control of time. Five types of furnaces desecribed. (To be continued.)

18a-4. Heat Treating During 1947. Arthur R. Elsea. *Metals Review,* v. 21, Jan. 1948, p. 5, 7, 9, 11.

Reviews progress in fundamentals as reflected in the current literature. Homogenization; austenite decomposition; tempering and mechanical properties; carburization; controlled atmospheres.

18a-5. Products and Processes for Heat Treating. *Metals Review,* v. 21, Jan. 1948, p. 13, 15, 17.

An index to new equipment developed or improved during the past 12 months. Electric and gas-fired furnaces; carburizing and cyaniding; gas atmospheres and generators; salt baths; induction heating; burners, valves, fuel generators; high-alloy furnace parts; refractories and insulation; miscellaneous accessories.

18a-6. Bright Hardening and Tempering Tiny Parts—I. Harry L. Hovis and A. W. Marks. *American Machinist,* v. 92, Feb. 12, 1948, p. 91-94.

Operations on items such as precision watch or instrument parts, where decarburization, carburization or oxidation is not permitted. (To be continued.)

18a-7. Ferrotherm Plant Specializes in Bright Hardening, Annealing and Brazing: Part II. *Industrial Heating,* v. 15, April 1948, p. 675-676, 678, 680, 682.

Facilities of the Ferrotherm Co. in two plants, in Cleveland and in Pittsburgh, respectively.

18a-8. Standardized Rings for Semi-automatic Hardening of Gears and Similar Parts. *Machinery Lloyd* (Overseas Edition), v. 20, April 10, 1948, p. 99-100.

Equipment.

18a-9. Results of Research in Controlled Vacuum Heat Treating. Jack Huebler. *Industrial and Engineering Chemistry,* v. 40, May 1948, p. 825-831.

Effects of H_2, N_2, O_2 in steel on such heat treating operations as annealing, malleableizing, and carburizing were demonstrated. The influence of these gases on Be-Cu valve springs. Procedures required to obtain improvements in the physical properties of steels while undergoing the various heat treating operations. Significant improvement is obtained by vacuum heat treatment for malleableizing compared with treatment with the usual prepared atmospheres. Similarly significant improvement in the fatigue life of the Be-Cu valve springs is also obtainable. Equation by which the carbon gradient after any diffusion treatment may be predicted.

18a-10. Heat-Treating Principles and Their Application to Salt Baths. Haig Solakian. *American Machinist.* v. 92, April 8, 1948, p. 96-98; April 22, 1948, p. 90-93; May 6, 1948, p. 118-121.

18a-11. Salts for Heat Treatment. Ernest Hague. *Metallurgia,* v. 38, May 1948, p. 39-43.

18a-12. Instruments Aid Metallurgical Research at Mack Mfg. Corp. *Instrumentation,* v. 3, Second Quarter, 1948, p. 12-14.

Heat treating aspects which use control instruments.

18a-13. Heat Transfer in a Recirculating Furnace. M. J. Sinnott and C. A. Siebert. *Industrial and Engineering Chemistry,* v. 40, June 1948, p. 1039-1044.

The heating of steel from room temperature to 600, 800, 1000, and 1200° F. was studied and the effect of air temperature and air velocity on the rate of heat transfer was investigated.

18a-14. Modern Heat Treating; A Reference Index. F. R. Morral. *Iron Age,* v. 161, June 10, 1948, p. 83-85.

105 references are listed and indexed.

18a-15. Mechanized Induction Heating. Ray Vicker. *Steel Processing,* v. 34, June 1948, p. 302-303, 305.

Equipment and procedures.

18a-16. Heat Treating Research Aids Development and Production at Mack Manufacturing Corporation. C. C. Roberts. *Steel Processing,* v. 34, June 1948, p. 310-312, 319.

Facilities.

18a-17. Fixtures Facilitate Induction and Flame Hardening. V. E. Hillman. *Iron Age,* v. 161, June 24, 1948, p. 90-94.

Ingenious fixtures for holding cast and wrought parts during heating.

18a-18. The Vital Role of Heat Treating Research. C. C. Roberts. *Automotive Industries,* v. 99, July 1, 1948, p. 42-43, 70, 72, 74.

Equipment and functions of a heat treating department in its development and production of vehicles and engines.

18a-19. W. S. Bidle Co. Equipped for Commercial Heat Treating. *Industrial Heating,* v. 15, July 1948, p. 1220-1222, 1224, 1226, 1228.

Facilities of Cleveland firm.

18a-20. Heat Treating Today. Arthur R. Elsea. *Metals Review,* v. 21, July 1948, p. 9, 11.

Reviews literature of the past year, which is said to have been largely a period of assimilation and discussion of wartime research rather than one of new developments. (References to "A.S.M. Review of Current Metal Literature".)

18a-21. Heat Treating Equipment and Supplies. *Metals Review,* v. 21, July 1948, p. 13, 15, 17, 19, 21, 23.

New products introduced during the past six months in above category.

18a-22. The Thermal Etching of Metals. R. Shuttleworth. *Metallurgia,* v. 38, July 1948, p. 125-131.

When a polished metal specimen is maintained at a high temperature, grooves develop where the crystal boundaries intersect the surface, and in some atmospheres striations form on the crystals. Observations of these phenomena for iron and steel, copper, tungsten and tantalum, and silver. The various theories advanced to explain the formation of boundary grooves and striations.

18a-23. Property Changes During Aging. A. H. Geisler. *Metals Technology,* v. 15, Aug. 1948, T. P. 2436, 25 pages.

An orderly correlation of the phenomenological facts of precipitation hardening. Certain changes in properties, such as increase in electrical resistance and in hardness, are proposed as characteristics of the "coherent state" without assuming any new mechanism of hardening. 38 ref.

18a-24. A Modern Commercial Heat Treating Plant. Arthur Q. Smith. *Industrial Gas,* v. 27, Sept. 1948, p. 15, 29.

Facilities of Syracuse Heat Treating Corp.

18a-25. Predicting the Effect of Complex Tempering Cycles. J. L. Waisman and W. T. Snyder. *American Society for Metals, Preprint* No. 8, 1948, 14 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1400-1411; discussion, p. 1412-1414.

A method developed for the above as applied to the hardness of quenched steels. Experimental isothermal tempering data are presented for two medium-carbon alloy steels. Predictions of effects on hardness of variations in heating and cooling rate, and of fluctuations at the tempering temperature.

18a-26. Heat Transmission in Strip-Coil Annealing. J. D. Keller. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 60-67; discussion, p. 67-70.

The important factor is conduction through the film and not radiation or metallic contact as is usually assumed. Theoretical analysis of the problems involved.

18a-27. Heat Treating Used to Vary Properties of Precision Cast Materials. Edwin Laird Cady. *Materials & Methods,* v. 28, Dec. 1948, p. 72-75.

How a range of properties can be provided with a minimum number of alloys by heat treatment of aluminum, beryllium copper, stainless steels, and toolsteels.

18b—Ferrous

18b-1. Sulphide Penetration in the Carburization of Steel. A. Preece and K. J. Irvine. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 336-343.

Mechanism demonstrated by experiments in which suitably coated specimens of Armco iron were exposed to carburizing mixtures of CO and CO_2. By adjusting the gas mixture, deep-seated inclusions of iron sulphide were converted into iron oxide, and also into manganese sulphide by prolonged treatment at 1000° C. Results also showed interrelated effects between carbon, sulphur, and oxygen which may be of significance in the segregation and homogenization of steel castings.

18b-2. Anisothermal Formation of Bainite and Pro-Eutectoid Constituents in Steels. Leonard D. Jaffe. *Metals Technology,* v. 14, Dec. 1947, T.P. 2290, 14 pages.

Principles that govern the relations between isothermal and anisothermal decomposition of austenite. The effect of holding austenite at one temperature upon its subsequent decomposition at another temperature below the stability range of the austenite was studied. 12 ref.

18b-3. Induction Heating Triples Die Life. J. M. Butler. *Steel,* v. 122, Jan. 19, 1948, p. 98, 100.

18b-4. Cyclic Annealing of Steel Forgings Saves Time, Betters Quality. Kenneth Rose. *Materials & Methods,* v. 27, Jan. 1948, p. 71-74.

Use of close control over time and temperature in annealing of steel forgings with resulting speedup of the entire process.

18b-5. Application of the TTT-Curves in Heat Treating by Induction. Howard E. Boyer. *Steel Processing,* v. 34, Jan. 1948, p. 29-35.

Details as applied to various steel compositions.

18b-6. The Stainless Steels—Hardening and Annealing of the Low, Medium and High-Carbon Steels. Lester F. Spencer. *Steel Processing,* v. 34, Jan. 1948, p. 36-40, 51.

Recommended procedures. Microstructures resulting from various treatments. (To be continued.)

18b-7. Principles of Modern Heat Treating. R. M. Dyke. *Steel,* v. 122, Jan. 26, 1948, p. 55-60, 62, 64.

What happens within steels during heat treatment. A discussion of fundamentals.

18b-8. Large Car-Type Furnaces Featured at Pearson Industrial Steel Treating Co. *Industrial Heating,* v. 15, Jan. 1948, p. 128, 130, 132, 134.

Equipment and procedures. (To be continued.)

18b-9. Induction Hardening Cast Iron. *Iron Age,* v. 161, Jan. 29, 1948, p. 76. Condensed from "Some Factors Affecting the Induction Hardening of an Alloy Cast Iron", by J. R. Sloan and R. H. Hays.

Previously abstracted from Preprint No. 5, American Society for Metals. See 18-172, R.M.L., v. 4, 1947 *(Metals Review,* Sept. 1947).

18b-10. The Mechanical Properties of a Nickel-Chromium-Molybdenum Steel Obtained by Stepped Quenching. G. Delbart and R. Potaszkin. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 527-535.

Compares the mechanical properties of a Ni-Cr-Mo steel after stepped quenching with those obtained after air cooling or oil quenching followed by tempering. The influence of temperature of the intermediate quenching bath and of tempering

temperature on mechanical properties was studied, and the results were plotted against tensile strength. Best results were obtained with martensitic quenched structures obtained by direct oil quenching or air cooling, and also by stepped quenching with intermediate holding at 200° C. or between 400 and 600° C. for the range of tensile strength between 90 and 110 kg. per sq. mm. Similar results can be obtained by holding in the bainitic region and tempering.

18b-11. The Evolution and Absorption of Hydrogen by Steel in Industrial Reheating Furnaces. J. Cameron. *Journal of the Iron and Steel Institute,* v. 157, Dec. 1947, p. 609-615.

The influence of reheating-furnace atmospheres on the hydrogen content of steel ingots is discussed from the theoretical standpoint. The hydrogen content of furnace atmospheres is calculated for a variety of fuels and it is shown to be negligible for all practical conditions of humidity and combustion. Local concentrations of hydrogen caused by the action of water vapor on iron are not likely to exceed 2%. Atmospheric hydrogen content has practically no effect on the ingot hydrogen content.

18b-12. Use of Subzero Temperatures for Treating and Assembling Metal Parts. *Machinery* (London), v. 72, Jan. 8, 1948, p. 43-45.

Use in achieving dimensional stability; in shrink-fit assembly processes; in air cooling of metal-cutting tools; and in subzero hardening of steels.

18b-13. Annealing Ovens; Equipment and Practice for Malleable Iron. James H. Lansing. *American Foundryman,* v. 13, Jan. 1948, p. 38-40.

The various types; insulating and refractory materials; annealing schedules.

18b-14. Flame Hardening Machine Tool Parts. W. D. Whalen. *Welding Journal,* v. 27, Jan. 1948, p. 11-18.

Basic methods of spot hardening, spinning, progressive, and combination flame hardening. (Presented at 47th Annual Convention of International Acetylene Assoc., Cincinnati, May 20-21, 1947.)

18b-15. Cyclic Annealing Alloy Steel Forgings. *Steel,* v. 122, Feb. 9, 1948, p. 99.

Process is said to produce highly machinable metal structures in a few minutes.

18b-16. Fundamentals of Annealing Low-Carbon Steel. Part II. G. Sachs, L. J. Ebert, A. W. Dana, and M. H. Jones. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. 98-100.

Supplements results of experiments previously described in *Proceedings of the AISE,* 1946. In the previous paper, yield strength and elongation were chosen as major criteria. Charts were constructed which showed relationships between annealing time and temperature as it affects these properties. Application of the data to commercial problems showed the need for similar plots for hardness and grain size, which are herewith presented.

18b-17. Scale; A Discussion of Data on Oxidation. W. Trinks. *Iron and Steel,* v. 21, Jan. 1948, p. 35-36. Reprinted from *Industrial Heating,* v. 14, Oct. 1947, p. 1601-1602, 1604.

See item 18-227, R.M.L., v. 4, 1947.

18b-18. Symposium on the Peeling of White-Heart Cast Iron; Introduction. J. C. W. Humfrey. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 1-2.

The occurrence of the defect known as "peel" in white-heart malleable castings reached serious proportions during the last war, through the failure of track links in military vehicles. The four papers of the symposium record the incidence of this defect and show how its causes and the means of elimination were discovered.

18b-19. The Formation of Peel on White-Heart Malleable Cast Iron. A. Preece and K. J. Irvine. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 3-8.

Studied by exposing suitable specimens to mixtures of CO, CO_2, and SO_2. It was found that the essential conditions are the presence of sulphur in the gases and a high CO content. The oxide network associated with peel formation is caused by preferential oxidation of Si. In a sufficiently reducing atmosphere, absorption and diffusion of sulphur take place, forming a continuous band of iron sulphide beneath the surface of the iron. The depth of this band is directly related to the amount of surface decarburization.

18b-20. Peel on White-Heart Malleable Cast Iron. J. S. Bowden. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 9-14.

Development of tests to detect peel on track links and on other castings which are to be used without machining. Experiments devised to determine conditions under which peeling takes place. A theory is advanced that peel formation occurs

by preferential oxidation of the silicon in the metal to form fayalite when the $CO:CO_2$ ratio in the malleableizing atmosphere is abnormally high. It is also demonstrated that peel can be produced on Si-Mn steel.

18b-21. Peeling of White-Heart Malleable Iron. G. R. Webster and A. E. Probst. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 15-19.

Peeling, as distinct from scaling. Examples of the defect. Experiments with malleable iron of varying thicknesses and with various sulphur contents have shown that a high sulphur content in the iron ore used for malleableizing causes peeling.

18b-22. Experimental Work Carried Out at the British Cast Iron Research Association. J. Bernstein. *Journal of the Iron and Steel Institute,* v. 158, Jan. 1948, p. 20-36.

Characteristic microstructure of peeled samples of white-heart malleable cast iron. The prime cause of peeling is the inward penetration of sulphur from the annealing ore or from sulphur-containing gases in the annealing atmosphere. Factors affecting depth of the peeled layer are enumerated. Peeling is demonstrated to be a complex phenomenon involving decarburization, sulphurization, and inward penetration of oxygen; desulphurization may also occur. The diffusion processes involved are discussed. 10 ref.

18b-23. Recuit Rapide des Fontes Malléables. (Rapid Annealing of Malleable Cast Irons.) Gabriel Joly. *Fonderie,* Oct. 1947, p. 857-860.

Disadvantages of the ordinary French annealing furnaces for malleable cast iron; and suggestions for design changes and changes in composition of the irons.

18b-24. Influence d'un Recuit Préalable du Fer dans l'Hydrogene sur son Comportement Ultérieur lors du Chargement a Froid en ce Gaz. (Effect of Preliminary Annealing of Iron in Hydrogen on Its Further Behavior After Cold Charging in This Gas.) Paul Bastien. *Comptes Rendus* (France), v. 225, Dec. 22, 1947, p. 1321-1322.

Silicon Armco irons were annealed 48 hr. at 880° C. in argon or hydrogen and their structures studied. It was found that annealing eliminates most impurities, and renders the iron more resistant to acid attack. Importance of the adsorbed surface layer of gas is emphasized.

18b-25. Recent French Work on Interrupted Quenching. Georges Delbart. *Metal Treatment,* v. 14, Winter 1947-48, p. 202-212.

An extended theoretical discussion; results clarified by charts, tables, and photomicrographs; applications; and conclusions. 22 ref.

18b-26. Nonmetallic Grain Boundary Material in Carburized Cases. John J. Kary. *Metal Progress,* v. 53, Feb. 1948, p. 218-222.

Machine parts often come from the carburizing process with a light scale, and grain boundaries at the surface are outlined by a nonmetallic substance. Results of a study of operating conditions that influence this effect, and of the nature of this nonmetallic phase.

18b-27. Magnetic Properties of Generator Rotors as Affected by Treatment. G. S. Downing, W. E. Jones, and L. E. Osman. *Metal Progress,* v. 53, Feb. 1948, p. 235-240.

Properties resulting from a five-stage heat treatment (equalize, anneal, age, low normalize, and high temper), giving well agglomerated and dispersed carbides.

18b-28. Nitrogen as a Carrier Gas in Gas Carburizing. W. H. Holcroft and R. P. Harris. *Metal Progress,* v. 53, Feb. 1948, p. 241-246.

In practice it is found that erratic results and shallow cases are likely to result when inert nitrogen is used as a carrier gas for methane or other hydrocarbons. Laboratory tests indicate that extremely minute amounts of H_2O and CO_2 upset the furnace atmosphere equilibrium, and that a moderate amount of CO and H_2 are required to offset this condition.

18b-29. Induction Hardening Cuts Cost of Heat Treating Grass Shear Blades by 60%. *Industrial Heating,* v. 15, Feb. 1948, p. 228, 230.

Use of induction hardening by Hancock Mfg. Co.

18b-30. Cyclic Annealing of Alloy Steel Forgings in Salt Baths. *Industrial Heating,* v. 15, Feb. 1948, p. 252, 254.

The extension of the scope of interrupted quenching operations to include cyclic annealing. Advantages.

18b-31. Gear Teeth Hardening by LeTourneau. Will C. Grant. *Industrial Gas,* v. 26, Feb. 1948, p. 7-9.

18b-32. Gardner-Denver Co. a Pioneer in Heat Treatment. Gerald Eldridge Stedman. *Industrial Gas,* v. 26, Feb. 1948, p. 11-14.

Equipment and procedures.

18b-33. Low-Temperature Treatment of Steel. H. E. Boyer. *Iron Age,* v. 161, Feb. 12, 1948, p. 69-73, 134-135; Feb. 19, 1948, p. 78-83.

In first part of a three-part ar-

ticle TTT-curves are used as a means of associating transformation characteristics of five different types of high-carbon steels with basic fundamentals of thermal treatment. In the second part an interesting correlation is shown between the volume of retained austenite before and after low-temperature treatment. The effect of tempering temperature on hardness and retained austenite volume of both cold treated and untreated steels.

18b-34. Low-Temperature Treatment of Steel. H. E. Boyer, *Iron Age,* v. 161, Feb. 26, 1948, p. 85-90.

How long should parts be held at the low temperature after the quench? Is there danger of cracking in parts subjected to low temperature? These and other typical operating questions are discussed for the benefit of the practical metallurgist and heat treater. The effect of low-temperature treatment on some medium-carbon structural steels and some alloy carburizing grades. (Concluded.)

18b-35. Bright Hardening and Tempering Tiny Parts. Part II. Harry L. Hovis and A. W. Marks. *American Machinist,* v. 92, Feb. 26, 1948, p. 112-115.

Bright tempering with hydrogen eliminated part discoloration and degreasing, and gave greater production and finer finish to watch parts and small tools.

18b-36. Processos de Patenteamento e Patenteamento Electrico de Arame. (Patenting Processes and Electric Patenting of Wire.) Jean Reuter. *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 624-630; discussion, p. 631-632.

Heat treatments applied to hard and semi-hard carbon-steel wires, generally known as "patenting" or "tempering with lead". An electric patenting installation which is used to improve the resistance of the wire.

18b-37. Flame Hardening. Charles Delmar Townsend. *Steel Processing,* v. 34, Feb. 1948, p. 71-74, 87.

Reviews process, including steels to which it is applicable.

18b-38. Sheet and Strip; Continuous Vs. Batch Annealing. T. F. Olt. *Iron and Steel,* v. 21, Feb. 1948, p. 69-72.

Metallurgical characteristics obtained from both methods of annealing, comparative mechanical properties of products produced by variations in practice within the economic limits of each method, statistics covering heat requirements for the different methods, and investment costs for each.

18b-39. End Hardening of Rail Ends and Openhearth Frogs. R. W. Torbert. *Welding Journal,* v. 27, Feb. 1948, p. 107-110.

Presented at 28th Annual Meeting, A.W.S., Chicago, week of Oct. 19, 1947.

18b-40. Flame Softening. *Industry and Welding,* v. 21, March 1948, p. 86

Unit for flame softening roller-chain pins developed by Union Chain and Mfg. Co.

18b-41. Annealing Malleable Iron. R. P. Schauss. *American Foundryman,* v. 13, March 1948, p.34-38.

Modern annealing methods and equipment.

18b-42. Proper Precautions Eliminate Cracking in Toolsteel Heat Treatment. S. D. Smoke. *Materials & Methods,* v. 27, March 1948, p.86-88.

Much toolsteel is lost through careless and improper techniques in heat treating. Some points to watch to help eliminate such waste.

18b-43. The Stainless Steels. Part IV-A. Hardening and Annealing of the Low, Medium and High-Carbon Steels. Lester F. Spencer. *Steel Processing,* v. 34, Feb. 1948, p. 75-79.

Literature data correlated, tabulated and charted. 29 ref. (To be continued.)

18b-44. Production Heat Treating. *Steel Processing,* v. 34, March 1948, p.148-153.

Modern methods for heat treating ferrous metals. Improved furnaces, materials handling, control equipment, and induction heating. (To be continued.)

18b-45. Rapid Annealing of Malleable Iron Castings. Gabriel Joly. *Foundry Trade Journal,* v. 84, Feb. 26, 1948, p. 200-202. Translated from *Fonderie,* Oct. 1947, p. 857-860.

Previously abstracted. See item 18b-23, 1948.

18b-46. Whiteheart Malleable; A Review of Recent Developments in Industrial Gaseous Annealing. P. F. Hancock. *Iron and Steel,* v. 21, March 1948, p. 105-108.

(To be concluded.)

18b-47. A Comparison of Patenting Methods; Coal—Gas—Electric. *Wire Industry,* v. 15, March 1948, p. 187.

Heat treatment procedure for high carbon rods and wire up to 0.85%, which may be termed a continuous individual-strand treatment, in which the steel is heated to above critical temperature and cooled below that range in air, molten lead, or molten salts.

18b-48. How to Select Quenching and Tempering Oils for Treating Steel. E. L. H. Bastian. *Steel,* v. 122, March 22, 1948, p. 64-66, 86, 89; March 29, 1948, p. 79-82, 84.

The nature and function of various heat treating media, and the mechanics of quenching. Total-immersion quench methods for correlating comparative quench efficiencies with commercial experience, and martempering, austempering, tempering, annealing, and normalizing.

18b-49. Induction Hardening Reduces Blade Cost. *Electronics,* v. 21, April 1948, p. 134.

Use of a radio-frequency generator has enabled Hancock Manufacturing Co. to reduce the cost of hardening grass-shear blades from 2.5 to 1 cent per blade. In addition, quality is improved.

18b-50. Progress in the Heat Treatment of Steel. E. S. Davenport. *Scientific American,* v. 178, April 1948, p. 148-153.

Techniques used for isothermal transformation studies which have supplied the metallurgist with a new range of useful properties.

18b-51. Heat Treating 54-Foot Alloy Bars. F. H. Bremmer. *Steel,* v. 122, April 5, 1948, p. 77-78, 101-102.

New equipment for heat treating alloy steel bars before fabrication into drill collars. This oil quenching and tempering eqeuipment is designed to produce bars of uniform hardness which require a minimum of cold straightening after heat treating.

18b-52. Martempering of K-46 Tool and Die Steel. G. L. Kehl. *U. S. Atomic Energy Commission.* MDDC-526; LADC-205, Dec. 12, 1946, 9 pages.

Process applicable to sections not more than 1-in. thick. K-46 contains 0.85 to 0.95% C, 0.25 to 0.45% Si, 1.00 to 1.25% Mn, 0.40 to 0.60% Cr, 0.40 to 0.60% W, and 0.10% V.

18b-53. Stress-Relief Treatment of Iron Castings; Report of Sub-Committee T. S. 17 of the Technical Council of the Institute of British Foundrymen. *Foundry Trade Journal,* v. 84, March 25, 1948, p. 303-306, 308.

The available literature, private information, and questionnaire data are correlated and recommendations for full and modified stress relief. 11 ref.

18b-54. Coalescing Anneals. J. J. Curran. *Metal Progress,* v. 53, April 1948, p. 536-537.

Discusses letter by M. Portevin on above subject (Nov. 1947 issue) and also the development of theory and practice of spheroidizing steel at temperatures above AC_1.

18b-55. The Practical Heat Treatment of High Speed Steel Cutting Tools. W. E. Bancroft and W. W. Wight. *Metal Progress,* v. 53, April 1948, p. 545-555.

Recommended austenitizing conditions; rates of heating and cooling; temperatures of quenching before tempering; tempering conditions; uses of isothermal transformation; and surface conditions.

18b-56. Utilization of Recrystallization and Grain-Size Enlargement for Improvement of Quality of Transformer Steels. (In Russian.) F. P. Rybalko and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1503-1512.

A laboratory method for thermomechanical treatment of transformer steel. This easily applicable method makes possible production of a large-grain crystalline structure and thus cuts power losses of the material about in half. 15 ref.

18b-57. Laws of Grain Growth of Carbides During Isothermal Tempering. Part I. Grain Growth During Tempering of Carbon Steel. (In Russian.) S. Z. Bokshtein. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Dec. 1947, p. 1513-1520.

By means of static methods of microanalysis, a quantitative evaluation of the process of grain growth of the carbide phase in plain-carbon steel during isothermal tempering was obtained. This phenomenon consists of the continuous decrease of the number of small carbide particles and formation of large ones. This process is quite intensive during the first stage of tempering, but decreases quite markedly with the time. 12 ref.

18b-58. Whiteheart Malleable; A Review of Recent Developments in Industrial Gaseous Annealing. (Concluded.) P. F. Hancock. *Iron and Steel,* v. 21, April 1948, p. 141-144.

18b-59. An Evaluation of Quenching Oils by Means of the End Quench Test. C. A. Siebert and G. Sandoz. *Metals Technology,* v. 15, April 1948, T. P. 2353, 6 pages.

Data on the hardening power of five different oils representing three sources of supply. The end-quench test was used to evaluate the quenching power of the oils. Little, if any, advantage was found for use of a proprietary compounded oil in place of a straight mineral oil.

18b-60. Delayed Quench for Steel Castings. S. L. Gertsman. *American*

Foundrymen's Association, Preprint No. 48-2, 1948, 9 pages.

A "delayed quench" process for heat treatment of castings involves austenitizing at temperatures usually employed, a timed cooling from the austenitizing temperature to a temperature somewhat above AR_3 and a quench in water, followed by a draw to produce required mechanical properties. Cracking susceptibility is lessened and a considerable saving of furnace time is achieved.

18b-61. Effect of Manganese-Sulphur Ratio on the Rate of Anneal of Black-Heart Malleable Iron. J. E. Rehder. *American Foundrymen's Association, Preprint* No. 48-30, 1948, 11 pages; discussion, p. 8-11.

Two series of test bars containing 0.09 and 0.21% S, respectively, were cast in which the Mn content was varied. Minimum first and second-stage isothermal annealing times were determined for each bar, and the results plotted vs. Mn-S ratio. Optimum Mn content is given by the formula % Mn = (1.7 x %S) + 0.15.

18b-62. Gray Iron Hardenability and Its Relation to Air Quenching of Castings. R. A. Flinn and R. J. Ely. *American Foundrymen's Association, Preprint* No. 48-35, 1948, 8 pages.

The range of hardenability available in unalloyed and Ni-Mo gray iron, and the use of hardenability values in planning the quenching of castings. Gray iron follows with good reproducibility the same relationships found in steels even at retarded cooling rates. Hardening of castings by air quenching to minimize distortion and cracking is correlated with these hardenability values and the surface-to-volume ratio of the casting. Spot hardening by flame and induction heating followed by air cooling is also correlated with the data. 10 ref.

18b-63. Conventional Vs. Salt Bath Hardening of Cast Iron Cylinder Liners. G. M. Lahr. *American Foundrymen's Association, Preprint* No. 48-42, 1948, 6 pages.

Compares two salt-bath heat-treating methods with the conventional quench-and-draw treatment. Advantages of the salt-bath methods.

18b-64. The Mechanical Properties of a Nickel - Chromium - Molybdenum Steel Obtained by Stepped Quenching. G. Delbart and R. Potaszkin. *Engineer's Digest* (American Edition), v. 5, March-April 1948, p. 120-124.

Previously abstracted from *Journal of the Iron and Steel Institute*, v. 157, Dec. 1947, p 527-535. See item 18b-10, 1948.

18b-65. Modified Martempering. Wilhelm Olson and Gerald Nevins. *Industrial Gas,* v. 26, April 1948, p. 10-11, 16, 18-19.

Use for hardening of intricately shaped dies without serious warpage or distortion. While some of these dies are made from air-hardening, high-C, high-Cr, shock-resistant steel, the greater majority are made of Mn-Cr-W oil-hardening steel.

18b-66. Steel Heat Treating Processes and Equipment. S. D. Smoke. *Materials & Methods,* v. 27, April 1948, p. 93-104.

A reference manual containing information and data on basic methods and principal types of equipment.

18b-67. Stress-Relief Treatment of Iron Castings. *Foundry Trade Journal,* v. 84, April 1, 1948, p. 325-328; April 8, 1948, p. 351-352.

Summarizes discussion of Report of T.S.17 Committee, Institute of British Foundrymen (March 25 issue.)

18b-68. A Cause of Poor Annealability of a Commercial Malleable Iron. J. E. Rehder. *Canadian Metals and Metallurgical Industries,* v. 11, April 1948, p. 20-21, 42.

The trouble was found to be caused by the presence of Sn, Pb, and Sb which probably were introduced as a piece of babbitt or other white metal, as a sleeve or bearing in a piece of scrap iron.

18b-69. Avoiding Die Losses Due to Faulty Heat Treatment Technique. Victor Evans. *Canadian Metals and Metallurgical Industries,* v. 11, April 1948, p. 22, 36.

Ten reasons why oil-hardened dies may crack during the hardening process.

18b-70. Selective Hardening of Wear Surfaces. J. F. Libsch and R. D. Guess. *Tool Engineer,* v. 20, May 1948, p. 31-32.

How high-frequency heating provides the right heat at the right place to provide maximum strength and surface hardness in small steel parts subjected to frictional contact.

18b-71. Carbonitriding—A Casehardening Process. Edward C. Bayer and M. R. Larson. *Steel Processing,* v. 34, May 1948, p. 264-267, 272.

Process and equipment. Photomicrographs and charts showing %C vs. distance from surface for various percentages of N_2 at the surface.

18b-72. Subzero Treatments for Carburized Medium-Alloy Parts. J. C. Selby and E. S. Rowland. *Metal Progress,* v. 53, May 1948, p. 667-671.

Effects of various subzero treatments on hardness, microstructure, and size change were studied for seven common alloy carburizing steels in the single quenched condition: S.A.E. 2512, 4620, 4820, 8620, 4320, 3310, and Krupp. It was concluded that significant increases in hardness can be obtained by subzero treatment of alloy carburizing steels quenched from the pot; that choice of temperature depends on the steel, the hardness desired, and costs involved; and that the product of subzero treatment is no better and is the same as that obtained by double quenching. Deep freezing, however, seems to have advantages where minimum distortion is of paramount importance.

18b-73. Hardenability Control for Alloy Steel Parts. A. L. Boegehold. *Metal Progress,* v. 53, May 1948, p. 697-709.

An extensive illustrated discussion of the use of hardenability bands and the tentative hardenability specifications set up by S.A.E. and A.I.S.I.

18b-74. Some Peculiarities in the Behavior of Steel During Rapid Heating by Means of High-Frequency Electric Current. (In Russian.) M. G. Lozinskii. *Izvestiya Akademii Nauk SSSR., Otdelenie Tekhnicheskikh Nauk.* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Jan. 1948, p. 109-130.

Three types of structural steels were investigated. The zone of hardening was found to increase sharply in size with decrease in the duration of the heating cycle and correspondingly increased with higher rate of heating. The data, which are charted and illustrated, indicate the effects of various alloying elements on displacement and size of the hardened zone. 18 ref.

18b-75. Direct Quenching; Experimental Practice at Ruhrstahl A. G. Witten. *Iron and Steel,* v. 21, May 1948, p. 181-182. Based on B.I.O.S. Miscellaneous Report No. 58.

Quenching billet and bars direct from rolling on a production basis in German plant.

18b-76. Gray Cast Iron; Some Principles Involved in Heat Treatment. Alfred Boyles. *American Foundryman,* v. 13, May 1948, p. 97-106.

Fundamental principles involved in the heat treatment of cast iron. Certain basic differences between this material and steel as regards transformation behavior during heating and cooling.

18b-77. Induction Hardening Expedites Production of Axle Shafts. Guy O. Hunt. *Industrial Heating,* v. 15, May 1948, p. 758, 760, 762.

18b-78. Heating and Heat Treating Operations in Production of Timken Railroad Bearings. *Industrial Heating,* v. 15, May 1948, p. 772, 774, 776, 778, 780, 782.

18b-79. New Technique Facilitates Brazing Stainless Steel. *Industrial Heating,* v. 15, May 1948, p. 784.

New process utilizes a hydrogen atmosphere more pure than any previously used.

18b-80. Precision Heat Treating Performed at Rochester Division of Lindberg Steel Treating Co. *Industrial Heating,* v. 15, May 1948, p. 856, 858, 860, 862.

(To be continued.)

18b-81. Heat Processing Easily Oxidized Metals. F. C. Kelley. *Iron Age,* v. 161, May 20, 1948, p. 84-89.

A technique for purifying and applying hydrogen atmosphere for furnace brazing, bright annealing, and sintering of high-Cr irons, Ni-Cr alloys and 18-8, including construction of several laboratory and commercial units. Assemblies that can be satisfactorily processed in this way.

18b-82. Heat Treating Special Trackwork at Bethlehem's Steelton Plant. *Railway Age,* v. 124, May 22, 1948, p. 40-41.

18b-83. Investigation by the Thermoelectric Method of Several Processes Which Take Place in Alloys. Part I. (In Russian.) Yu. M. Margolin. *Zhurnal Teknicheskoi Fiziki* (Journal of Technical Physics), v. 18, Jan. 1948, p. 61-70.

Tests were made to establish the value of the electromotive force method for the study of alloy solubility during heat treatment. 33 ref.

18b-84. Formation of Cracks in Steel During the Martensite Transformation. (In Russian.) E. S. Yakovleva and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics). v. 18, Jan. 1948, p. 71-74.

All cases of formation of cracks during tempering can be explained by one of two schemes. Artificial crack formation according to one of the schemes was produced in small specimens of different carbon contents.

18b-85. Transformation During Heating With High-Frequency Currents. (In Russian.) I. N. Kidin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Jan. 1948, p. 75-84.

Phase transformations of steel during thermoelectric treatment. It

was found that the characteristic feature of the transformation was the specific action of the current on the ferrocementite mixture and consolidation of the lines of force at the phase boundary, resulting in quicker formation of austenite nuclei than in other methods of heat treatment.

18b-86. Gas Carburizing With Town's Gas. D. S. Laidler. *Metallurgia,* v. 38, May 1948, p. 46-49.

The application of theories of diffusion of carbon into iron and steel has been studied over a long period in efforts to develop methods of carburizing which permit complete control. 13 ref.

18b-87. Gas Cyaniding Small Parts. H. N. Ipsen. *Iron Age,* v. 161, May 27, 1948, p. 84-87.

Use of a batch-loading, continuous-unloading, gas, cyaniding furnace, particularly adapted to cyaniding small thin-sectioned parts. Economic advantages of this process.

18b-88. "Submarine" Quench Technique Employed in Forming and Hardening Auto Leaf Springs. Gerald Eldridge Stedman. *Steel,* v. 122, June 7, 1948, p. 92-94.

Work is clamped to forming die on each of nine stations or "paddles" of wheel-shaped revolving unit and immediately quenched before tempering. A modified version of the single-operation process is also used for bumper treatment.

18b-89. Heat Treatment of Precision Bearings at S.K.F. A. L. Neudoerffer. *Instrumentation,* v. 3, Second Quarter, 1948, p. 3-5.

Procedures for ball and roller bearings.

18b-90. The Annealing of Cast Iron in Hydrogen. J. Bernstein. *Journal of the Iron and Steel Institute,* v. 159, May 1948, p. 11-15.

The decarburization of cast iron in dry and moist hydrogen atmospheres, and experiments in which white cast irons were annealed in carefully dried hydrogen. 10 ref.

18b-91. Flame Hardening—Principles, Applications, and Equipment. Merrill S. Rosengren. *Welding Journal,* v. 27, June 1948, p. 453-455.

18b-92. Heat Treating Special Trackwork at the Mill. *Railway Engineering and Maintenance,* v. 44, June 1948, p. 596-597.

Equipment by means of which crossings, frogs, and switches may be subjected to carefully-controlled heat treatment in order to increase resistance to wear.

18b-93. Quenching Steel in Molten Media. F. R. Morral. *Steel,* v. 122, June 21, 1948, p. 92-95, 116.

Cooling characteristics and "H" values of various molten quench salts and interpretations of "U" curves for quenched steels. 23 ref.

18b-94. Hardhet och sprödhet hos härdade mjuka kolstal. (Hardness and Brittleness in Quenched Soft Carbon Steels.) B. D. Enlund. *Jernkontorets Annaler,* v. 132, 1948, p. 91-104.

Investigations show that steels with a carbon content up to 0.20% become very brittle after quenching from a comparatively low temperature, whereas quenching from a higher temperature to maximum hardness makes them much more tough and ductile. Applicability to welding.

18b-95. Influence de divers elements d'addition sur le recuit de lafonte malleable a coeur noir: aluminium et bore. (Influence of Alloying Elements on the Annealing of Black-Heart Malleable Iron: Aluminum and Boron.) *Fonderie,* March 1948, p. 1087-1096.

A review. 17 ref.

18b-96. Cyclic Annealing of Alloy Steel Forgings. *Machinery* (London), v. 72, May 27, 1948, p. 653.

Briefly described, including equipment.

18b-97. Through-Carburizing of Low Carbon Steel Permits Purchasing and Fabricating Economies. Kenneth Rose. *Materials & Methods,* v. 27, June 1948, p. 68-71.

By adding 0.35% C after fabrication, fabricating advantages of low-carbon steel are made possible in a part which must be through-hardened for the intended service.

18b-98. Stress Relieving Large Gray Iron Castings for Diesel Engines. K. G. Presser. *Industrial Heating,* v. 15, June 1948, p. 932-934, 936, 938.

Methods and equipment.

18b-99. Magnetic Properties of Chromium-Nickel-Molybdenum Steels After Different Heat Treatments. (In Russian.) P. N. Zhukova and M. N. Mikheev. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 187-196.

Investigated for two Cr-Ni-Mo steels and correlated with mechanical properties. Apparatus for magnetic control of heat treatment and method of its use.

18b-100. Residual Stresses In Case-Hardened Steel Specimens, Quenched From Temperatures Below Ac_3. (In Russian.) E. S. Yakovleva and M. V. Yakutovich. *Zhurnal. Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 207-210.

Stresses were determined experimentally for 0.12%-C steel, case-hardened to a depth of 0.7 to 0.8 mm., and quenched from 810° C. in water.

18b-101. Heat-Treated Switch Points Show Increased Service Life. Horace C. Knerr. *Railway Engineering and Maintenance,* v. 44, July 1948, p. 717.

Tests, extending over a period of nearly a year, showed that heat treatment increased the useful life of switch points 200 to 800%, with consequent savings in labor and material.

18b-102. Some Aspects of the Overheating of Steel Drop Forgings. Part II: Nature of Overheating. H. J. Merchant. *Industrial Heating,* v. 15, June 1948, p. 964, 966, 968, 970, 972, 978.

The principal causes of, and factors influencing, overheating. An attempt to differentiate between overheated steel, severely overheated steel, and burnt steel. Methods used to detect overheating in alloy steel. (To be continued.)

18b-103. Quality Control Helps Make Better Rivets. Part II. Herbert Schneider. *Fasteners,* v. 5, no. 1, 1948, p. 8-9.

Effects of various annealing times and temperatures on Rockwell hardnesses and shear strength of 5/16-in. cold headed steel rivets.

18b-104. Stress-Relief Treatment of Iron Castings; Report of Sub-Committee T. S. 17 of the Technical Council. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p. B41-B45.

Recommendations based on survey of literature, and of data supplied by questionnaires. 11 ref.

18b-105. Gas Carburizing; a Review of the Equipment for the Wild-Barfield Process. *Automobile Engineer,* v. 38, June 1948, p. 215-216.

18b-106. New Compound Hardens Steel. *Engineering and Mining Journal,* v. 149, July 1948, p. 110.

A commercial product. "High-Speed-It," which does not contain cyanide and is non-poisonous; technique of application.

18b-107. Fundamentals Behind Heat Treating Operations. Chester M. Inman. *Metals Review,* v. 21, July 1948, p. 3, 5, 7.

First of a series of three lectures for the practical man on everyday problems in the working of steel.

18b-108. Principles and Applications of Isothermal Heat Treatment. J. M. Hodge. *Steel Processing,* v. 34, July 1948, p. 375-376. A condensation.

Deals only with steel.

18b-109. The Practical Use of a Controlled Atmosphere. A. W. Frank. *Industrial Heating,* v. 15, July 1948, p. 1124-1126, 1128, 1130.

Controlled-atmosphere generators made by Hevi Duty Electric Co., and some of the practical problems involved in using a controlled atmosphere for hardening steels.

18b-110. Multiple Tempering of Low-Alloy Toolsteel. B. Z. Berman. *Metal Progress,* v. 54, July 1948, p. 64.

Outlines technique developed to produce a screwdriver bit (minimum cross section 0.032 x 0.250 in.) able to withstand a twisting torque of 40 in.-lb. from 0.50%-C, 0.40%-Mn, 1.00%-Si, 0.50-Mo toolsteel.

18b-111. The Heat Treatment of Iron and Steel, Recalescence. L. F. Keeley. *Machinery Lloyd,* (Overseas Edition), v. 20, July 3, 1948, p. 68-72.

The fundamental mechanisms of heat treatment and the phase transformations accompanying it, including the phenomenon of increase in brightness at certain intermediate temperatures during gradual cooling from the incandescent state.

18b-112. Atmospheres for the Heat Treatment of Steel. Floyd E. Harris. *Metal Progress,* v. 54, Aug. 1948, p. 175-179.

A generalized but simplified statement of the commercial atmospheres used for modern heat treatment of steel, the elementary chemistry and physics applying to gas-metal reactions and diffusion of carbon, and a little of the historical background showing how present practice has been achieved after traveling down a long road of development. (To be continued.)

18b-113. Annealing Malleable Iron Castings. E. G. Billhardt. *Iron Age,* v. 162, Aug. 19, 1948, p. 86-89.

Featuring accurate and automatic time-temperature control, economy in operation, and flexibility in simultaneously annealing wide ranges of sizes and shapes of parts, the annealing furnace installation at Lake City Malleable typifies the advantages of electrically-heated elevator furnaces for annealing malleable iron castings. Furnace construction and cost and production data.

18b-114. Uber die autogene Oberflächenhärtung von Stahl. (Autogenous Surface Hardening of Steel.) H. Kalpers. *Metalloberfläche,* v. 1, July 1947, p. 157-160.

Process of autogenous surface hardening and its economy and application to numerous articles of steel. Burners and apparatus used for this purpose.

18b-115. The Influence of Temperature and Time of Heating on the Reduction of Residual Stress in Austenitic Steels. (In Russian.) L. A. Glickman and V. P. Tyekht. *Kotloturbostroenie* (Boiler and Turbine Manufacture), March-April 1948, p. 12-16.

The residual stress in disks of austenitic chromium-nickel steel (type YeYa 2 T) have been induced artificially using a heat treatment. Influence of the temperature of drawing in the temperature ranges of 600 to 850° C. on the decrease of residual stresses. Method of investigation and computation of obtained data using formula of Sachs. 14 references.

18b-116. Control of Carbon Content During Heat Treatment of Steel in Atmosphere Furnaces. W. H. Holcroft and Edward C. Bayer. *Materials & Methods,* v. 28, Aug. 1948, p. 59-61.

Basic facts of gaseous equilibrium and the use of equilibrium curves in the control of carbon concentration.

18b-117. A Progress Report on Experimental Development of Surface Carbon Restoration in Decarburized Coiled Rod and Wire Material. J. L. Kozma. *Wire and Wire Products,* v. 23, Aug. 1948, p. 680-689, 719-720.

Carbon restoration process, equipment and mechanism of carbon restoration. Chart of condensed data regarding carbon restoration tests on surface decarburized 1035 and 1038 steel rod; results of microscopic examination; and other data based on test charges.

18b-118. Impregnating Steel With Aluminum. *Steel,* v. 123, Aug. 23, 1948, p. 110.

Method used to improve corrosion resistance and conductivity.

18b-119. La nitruration. (Nitriding) H. Wiegand. *Revue de Métallurgie,* v. 45, March-April 1948, p. 105-117.

The process of nitriding of steel and its advantages for improving its mechanical properties. Effects on various types of machine parts. Comparative properties of various alloy steels with and without nitriding.

18b-120. The Properties of Oils Used in the Heat-Treatment of Steel. G. T. Dunkley. *Metal Treatment and Drop Forging,* v. 15, Summer 1948, p. 67-72.

Some practical notes on the selection of quenching oils for hardening steel, showing that viscosity is the most important property and emphasizing the desirability of controlling the temperature of the quenching bath. Properties necessary in tempering oils.

18b-121. Heat Treatment of Carbon and Alloy Steels for Vehicles and Engines. D. C. G. Lees. *Metal Treatment and Drop Forging,* v. 15, Summer 1948, p. 73-74

Carburizing, quenching, salt baths and oil tempering, and control.

18b-122. Heat Treatment of Gray Iron; Basic Principles and Practical Applications. *Canadian Metals & Metallurgical Industries,* v. 11, Aug. 1948, p. 17-18, 42.

Reviews three papers covering various phases of the above subject, presented at 52nd annual A.F.S. meeting, Philadelphia.

18b-123. Automatic Heat-Treatment and Inspection of Ball Bearings. *Machinery* (London), v. 73, Aug. 26, 1948, p. 313.

French arrangement is briefly described and diagrammed.

18b-124. Heat Treatment: Conventional and Isothermal. *SAE Journal,* v. 56, Sept. 1948, p. 18-21. Based on "Principles and Application of Isothermal Heat Treatment," by J. M. Hodge. (To be published in full in *SAE Quarterly Transactions.)*

Fundamental principles and advantages of isothermal treatment and a series of time-temperature diagrams on which cooling curves for the two different types of hardening, annealing, and normalizing are superimposed on the isothermal transformation diagram.

18b-125. New Developments in Tool Steels. Part III. George A. Roberts. *Tool & Die Journal,* v. 14, Sept. 1948, p. 62, 64-66, 68.

Use of tempering charts, bainitic treatments, bend tests, and carburization of high speed steel.

18b-126. Studies Factors Affecting Stabilization of Stainless Steels. *Steel,* v. 123, Sept. 6, 1948, p. 119.

Results of a study of factors affecting the stabilization of 18-8 stainless steels to determine the relative amounts of Ti and Cb necessary for effective stabilization, the injurious effects of carbon content, and the necessity for stabilizing heat treatments. The research was conducted for the Bureau of Aeronautics, Navy Department, by the National Bureau of Standards.

18b-127. Controlled Atmosphere Cycle Annealing. Thomas A. Frischman. *Iron Age,* v. 162, Sept. 9, 1948, p. 72-77.

Simultaneous cycle annealing of up to eight different grades of low to medium-carbon alloy steels, producing in each steel a good machinable structure. Construction of the five-zone controlled atmosphere fur-

nace used; and details of the "all purpose" cycle, fuel and power consumption, atmospheres, types of steel annealed, and structures and hardness obtained.

18b-128. Fatigue Tests on Crankshaft Steels. Part I. The Effect of Nitriding on the Fatigue Properties of a Chromium-Molybdenum Steel. *Journal of the Iron and Steel Institute,* v. 159, Aug. 1948, p. 385-400.

Tests showed that after nitriding for 10, 22, or 72 hr. at 485° C., fatigue fractures commenced in the vicinity of the junction between the case and the core; but with nitrided, hollow specimens with oil-hole, fractures commenced on the surface of the nitrided case. It was calculated that by nitriding crankshafts and airscrew shafts for 10 instead of 72 hr. at 485° C., a reduction in fatigue limit of approximately 0.7% would be obtained for sections approximately 3.0 in. in diameter without any form of stress concentration, while the fatigue limit of the oil-hole sections of the components would be slightly increased. 12 ref.

18b-129. Low-Temperature Stress Relieving. T. W. Greene. *Steel Processing,* v. 34, Sept. 1948, p. 483-489.

Previously abstracted from *Steel,* v. 123, Aug. 9, 1948, p. 78-82. See item 22b-242, 1948.

18b-130. Atmospheres for Clean Hardening and Carburizing. Floyd E. Harris. *Metal Progress,* v. 54, Sept. 1948, p. 337-343.

Reactions of gas atmospheres with steel and the differences between the atmosphere required for bright hardening and the one for carburization. The various gas-gas, gas-solid, and solid-solid equilibria involved.

18b-131. Hardenability of Constructional Steels. W. Steven. *Journal of the Birmingham Metallurgical Society,* v. 28, Sept. 1948, p. 169-188, discussion, p. 189-196.

Proceedings of recent symposium and summary of present knowledge concerning it.

18b-132. Induction Heating of Cylindrical Steel Bars. *Materials & Methods,* v. 28, Sept. 1948, p. 107.

Relationship between current efficiency and bar diameter of carbon-steel stock for frequencies of 1000, 3000, 10,000, and 500,000 cycles per sec.

18b-133. Mill Process for End-Hardening Rails. *Railway Age,* v. 125, Sept. 18, 1948, p. 72.

New process developed by Bethlehem Steel Co.

18b-134. Continuous Furnace Simplifies Annealing Austenitic Stainless. L. F. Spencer. *Iron Age,* v. 162, Sept. 23, 1948, p. 84-88.

Advantages resulting from the installation of an electric continuous furnace with controlled atmosphere, as a replacement for an oil-fired batch type furnace. Construction and operation, and data comparing production rates, pickling and annealing costs, and reject rates of parts annealed in the two types of furnaces.

18b-135. The Dimensional Stability of Steel. Part IV. Tool Steels. B. S. Lement, B. L. Averbach, and M. Cohen. *American Society for Metals, Preprint* No. 2, 1948, 31 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1061-89; discussion, p. 1089-1092.

Dimensional changes which occurred in four low-alloy and two high-alloy steels on aging at 68° F. for as long as 1 yr. after various hardening, tempering, and refrigeration treatments. Effects of these treatments on the basis of martensite decomposition and retained austenite transformation.

18b-136. The Metallography and Heat Treatment of 8 to 10% Nickel Steel. G. R. Brophy and A. J. Miller. *American Society for Metals, Preprint* No. 7, 1948, 18 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 1185-1201; discussion, p. 1201-1203.

Preliminary metallographic studies from which were developed a composition range and a heat treatment for a ferritic nickel steel intended for service at −320° F. Studies included determinations of thermal expansion characteristics and of microstructural changes during heat treatment. Notched-bar impact tests of low-carbon steels containing 3 to 15% Ni were also made.

18b-137. Stability of Steels at Elevated Temperatures. A. B. Wilder and J. O. Light. *American Society for Metals, Preprint* No. 36, 1948, 24 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 141-163; discussion, p. 163-166.

The stability of over 100 different types of steel at 900, 1050, and 1200° F. is being evaluated over a period of 11 years. Welded samples are included. Results obtained from an examination of 20 of these steels for evidence of structural changes, oxidation characteristics, and impact properties after exposure for 10,000 hrs. The influence of Zr, Cb and Ti on graphitization in Mo steels without Cr.

18b-138. Delayed Quench for Steel Castings. S. L. Gertsman. *Canadian Metals & Metallurgical Industries,* v. 11, Sept. 1948, p. 17-22, 32, 46.

Previously abstracted from *American Foundrymen's Association, Preprint* No. 48-2, 1948. See item 18b-60, 1948.

18b-139. The Heat Treatment of Dies. R. A. Smith. *Machinery* (London), v. 73, Sept. 16, 1948, p. 440-443.

Recommended procedures for hot-stamping dies, pressure die-casting dies, extrusion tools, shearing and blanking dies, dies for molded products, embossing dies, salt-bath installations, and methods of handling dies.

18b-140. Isothermal Heat Treatment. J. M. Hodge. *Steel,* v. 123, Oct. 11, 1948, p. 92-94, 112.

Previously abstracted from *SAE Journal,* v. 56, Sept. 1948, p. 18-21. See item 18b-124, 1948.

18b-141. Basic Conditions for High-Frequency Hardening of Toolsteel. (In Russian.) I. N. Kidin. *Stanki i Instrument* (Tools and Instruments), v. 19, June 1948, p. 10-13.

Results of investigation of factors to be considered, particularly influence of temperature and rate of heating. Optimum conditions for different toolsteels.

18b-142. Machining of Austenitic 18-8 Chromium-Nickel Steel. (In Russian.) M. I. Shitov. *Stanki i Instrument* (Tools and Instruments), v. 19, June 1948, p. 20.

Addition of potassium ferricyanide to the fused-salt quenching bath used for treatment of tools used for machining 18-8.

18b-143. Kaleni oceli s hlediska rontgenologa. (Quenching of Steel from the Roentgenologist's Point of View). (Concluded.) Petr Skulari. *Hutnické Listy* (Metallurgical Topics), v. 3, July 1948, p. 197-200; Aug. 1948, p. 231-233.

Results of X-ray examination of quenched steels. Various iron phases and their space lattices and parameters. Theories of the nature of martensite, and the properties of martensite from X-ray data. Examples similar to steel quenching can be found in other alloys characterized by a similar breakdown of the solid solution.

18b-144. Secondary Hardening of Tempered Martensite Alloy Steel. Walter Crafts and John L. Lamont. *Metals Technology,* v. 15, Sept. 1948, T.P. 2439, 42 pages.

A study was made to determine whether fresh martensite from residual austenite and precipitation hardening are essential to rehardening and the degree to which tempered martensite can be rehardened by precipitation of alloy carbides. The mechanism of carbide rehardening was also investigated. Steels investigated covered a range up to 1.5% C and up to 16% Cr, 8% Mo, 5% V, or 20% W, and various combinations of these elements. Most of the work was done on 0.50%-C, single-alloy steels. Details of method of calculating tempered hardness, including several examples. 12 ref.

18b-145. Factors Influencing the Spheroidization of Steel. E. V. Tull. *Metallurgia,* v. 38, Sept. 1948, p. 257-262.

A review of previous work on the subject, which was carefully studied prior to an experimental investigation. 48 ref.

18b-146. Steel Treatments; Practical Aspects of Isothermal Annealing, Austempering, Martempering and Deep Freezing. J. Shaw. *Iron and Steel,* v. 21, Sept. 1948, p. 391-396. (To be continued.)

18b-147. Hardness and Brittleness of Quenched Soft Carbon Steels. *Engineer,* v. 186, Sept. 24, 1948, p. 310-311.

Discusses recent paper of above title by B. D. Enlund, in *Jernkontorets Annaler,* v. 132, No. 4, 1948, p. 91-104. Reproduction of some of the data in the form of tables and graphs, both for this article and for four other ones on a similar subject which are referred to.

18b-148. Flame Hardening Methods and Techniques. J. R. Burg. *Welding Journal,* v. 27, Oct. 1948, p. 805-809.

Types of locomotive equipment that lend themselves to flame hardening. Why flame hardening is chosen rather than some other mode of surface hardening. Recommends use of equipment designed and built for specific jobs rather than makeshift adaptation of worn-out machine tools. Also recommends use of as many automatic features as possible.

18b-149. Hardening of Cast Iron Using High-Frequency Methods. (In Russian.) M. I. Shitov. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 23-25.

Recommends high-frequency hardening for obtaining gray iron having high wear resistance. Substitution of gray iron for steel in many cases is thus made possible.

18b-150. Steel Treatments; Practical Aspects of Isothermal Annealing, Austempering, Martempering and Deep Freezing. (Concluded.) J. Shaw. *Iron and Steel,* v. 21, Oct. 1948, p. 443-445.

Deals with martempering and deep freezing. 10 ref.

18b-151. High Frequency Induction Surface Hardening. Joseph F. Libsch. *Steel,* v. 123, Nov. 15, 1948, p. 97-102, 106.

Development of more efficient equipment, refinement of coil design, and better understanding of the metallurgical phenomena involved have extended use of the process during the past decade.

18b-152. Induction Hardening of Cold Rolls. G. W. Seulen and H. Kuhlbars. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 393-395. Condensed from *Iron and Coal Trades Review,* v. 156, June 4, 1948, p. 1159-1164.

New method and equipment for hardening the rolls used for the cold rolling of sheet or strip.

18b-153. Induction Speeds Production. R. A. Nielsen. *American Machinist,* v. 92, Nov. 18, 1948, p. 112-113.

Three typical jobs in which induction heating is used for brazing and hardening.

18b-154. Heat Treating Parts for Apex Appliances. *Industrial Heating,* v. 15, Nov. 1948, p. 1908, 1910, 1912, 1914, 1916.

Equipment and procedures.

18b-155. Deep Freezing of Small Tools. Henry L. Wainwright. *Machinery* (London), v. 73, Nov. 4, 1948, p. 643-644.

Effects of cold treatment at −83° C. on drills, reamers, cutters, and hobs. Performance has been improved by 100 to 500%.

18b-156. Heat Treating Stainless Steel by Salt Bath. L. Sanderson. *British Steelmaker,* v. 14, Nov. 1948, p. 518-519.

New method in which the welding flux is eliminated at lower cost, and the annealing more cheaply and quickly effected.

18b-157. Take Care of Small Castings. H. B. Gilson. *Welding Journal,* v. 27, Nov. 1948, p. 955.

How to make an annealing bin from an old storage tank.

18b-158. Heat Treatment of Precision Bearings at SKF. A. L. Neudoerffer. *Industrial Gas,* v. 27, Nov. 1948, p. 5-7, 27-29.

18b-159. High Speed Flame Hardening Speeds Chain Production. Arthur Q. Smith. *Industrial Gas,* v. 27, Nov. 1948, p. 8-9.

18b-160. Improved Silicon-Iron for Electrical Equipment. Weston Morrill. *Metal Progress,* v. 54, Nov. 1948, p. 675-678.

Results of a 15-yr. study of means whereby large crystals can be made to grow in transformer sheet, at will, with axes pointed in a uniform direction. Controlled-atmosphere heat treatment is the principal factor involved.

18b-161. Practical Aspects of Isothermal Annealing. J. Shaw. *Steel Processing,* v. 34, Nov. 1948, p. 600-604, 613.

Previously abstracted from *Iron and Steel,* v. 21, Sept. 1948, p. 391-396; Oct. 1948, p. 443-445. See items 18b-146 and 18b-150, 1948.

18b-162. High-Frequency Induction Hardening of Lathe Bed Ways. George H. DeGroat. *Machinery,* v. 55, Dec. 1948, p. 160-163.

Application of induction heating that demonstrates value of the process for hardening long parts with a minimum of distortion.

18b-163. Etappglödgning i kvalitetsstaltillverkning. (Cyclic Annealing in Production of High-Quality Steel.) Erik Tholander. *Jernkontorets Annaler,* v. 132, No. 10, 1948, p. 367-431; discussion, p. 431-446.

Utilization of the isothermal transformation of austenite after hot working of steel. It was concluded that rapid isothermal transformation to a pearlitic structure having good machinability is possible for most of the common oil or air-hardening alloy steels. 11 ref.

18b-164. High-Frequency Induction Hardening; The Effect of Prior Structure on Carbide Solution Under Extremely Rapid Heating Rates. R. J. Brown. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 241-245.

The effect of extremely rapid heating rates upon the structure of the surface layers of 0.35 to 0.40% carbon steel and Mn-Mo steel of similar carbon content, and the effect of the prior condition of the steel in relation to carbide solution and homogenization of carbon distribution in the final structure.

18b-165. Isothermal Heat-Treatment for Precision Hardening. C. T. Wilshaw. *Metallurgia,* v. 39, Nov. 1948, p. 3-6.

Use of the isothermal-transformation diagram in isothermal hardening or martempering. Limitations are indicated; and the discussion of the practical aspects includes a description of an existing plant.

18b-166. Structural Changes During Continuous Cooling. Carl A. Liedholm. *Metal Progress,* v. 54, Dec. 1948, p. 849-856.

Information shown on continuous-cooling diagrams and data obtained from flat Jominy bars can be used to advantage in planning practical heat treatments. Recommends ex-

tension of such data to include slower cooling rates than heretofore.

18b-167. The Temperature Range of Martensite Formation. R. A. Grange and H. M. Stewart. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 467-490; discussion, p. 490-501.

Previously abstracted from *Metals Technology,* June 1946, T. P. 1996. 11 ref. See item 18-153, 1946.

18b-168. Hardenability Effects in Relation to the Percentage of Martensite. J. M. Hodge and M. A. Orehoski. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 502-511; discussion, p. 511-512.

Previously abstracted from *Metals Technology,* April 1946, T. P. 1994. See item 18-108, 1946.

18b-169. The Hardenability Concept. John H. Hollomon and L. D. Jaffe. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 601-612; discussion, p. 612-616.

Previously abstracted from *Metals Technology,* Jan. 1946, T. P. 1926. 23 ref. See item 18-54, 1946.

18b-170. Hardenability and Quench Cracking. L. D. Jaffe and John H. Hollomon. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 617-624; discussion, p. 625-626.

Previously abstracted from *Metals Technology,* Jan. 1946, T. P. 1927. 17 ref. See item 18-55, 1946.

18b-171. Relationship Between Hardenability and Percentage of Martensite in Some Low-Alloy Steels. J. M. Hodge and M. A. Orehoski. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 627-638; discussion, p. 638-642.

Curves correlate hardenability with 50% martensite with 99.9, 95, 90 and 80% martensite structures; curves correlate calculated and actual hardenability for above structures; curves correlate carbon content and hardness of same structures.

18b-172. Graphitization of White Cast Iron; Effect of Section Size and Annealing Temperature. Richard Schneidewind, D. J. Reese, and A. Tang. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 252-258; discussion, p. 258-259.

Previously abstracted from preprint. See item 4b-9, 1948.

18b-173. Controlled Atmospheres From City Gas for the Heat-Treatment of Steels. Ivor Jenkins. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 172, 1947, p. 556-613; discussion, p. 613-617.

Previously abstracted from *Metals Technology,* v. 14, Jan. 1947, TP 2121. See item 18-24, 1947.

18c—Nonferrous

18c-1. Continuous Annealing Nonferrous Strip. E. S. Kopecki. *Iron Age,* v. 161, Jan. 8, 1948, p. 46-50.

Use of the controlled-atmosphere, vertical strip annealing furnace permits close control over the surface quality and metallurgical characteristics of many types of nonferrous metals and alloys. Use of an electrical heat source enhances control over temperature conditions, while the "vertical" feature offers substantial savings in floor space.

18c-2. Economical Short Run Stamping Dies. Walter G. Patton. *Iron Age,* v. 161, Feb. 12, 1948, p. 84-86.

Technique used by Ford Motor Co. for producing dies of Cerro-type alloys and chilling them to −320° F. in liquid nitrogen to give them the hardness and abrasion resistance required for stamping sheet-metal parts. Up to 250 parts can be stamped before the dies need rechilling. The technique provides an economical means for producing experimental stamped-sheet parts. Alloys are based on bismuth.

18c-3. Atmospheres and Controlled Atmosphere Furnaces for Nonferrous Metals. William Lehrer. *Metal Progress,* v. 53, March 1948, p. 393-402.

Modern practice in bright annealing of the heavy nonferrous metals and alloys, with some notes on recent practice in the precious metal industry.

18c-4. Continuous Annealing of Soft Drawn Copper Wire. Leonard O. Walde. *Wire and Wire Products,* v. 23, May 1948, p. 391-393, 425.

Patented process and equipment developed by Cook Engineering Co. and used by Collyer Insulated Wire Co. for annealing copper wire in conjunction with the wire-drawing operation.

18c-5. Properties of Aluminum Bronzes at Subzero and High Temperatures. Robert I. Jaffee and Robert H. Ramsey. *Metal Progress,* v. 54, July 1948, p. 57-63.

Results of a comprehensive series of tests on three typical aluminum bronzes, over a wide range of temperature. Welding of wrought speci-

mens decreases impact and elongation at subzero temperatures.

18c-6. Aging in Gas Turbine-Type Alloys. Nicholas J. Grant and Joseph R. Lane. *American Society for Metals, Preprint* No. 33, 1948, 29 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 95-122; discussion, p. 122-124.

Four high-temperature alloys were investigated to determine their aging characteristics. Included were low-carbon Vitallium, modified high-carbon Vitallium, the Ni-Co-Cr-Mo alloy designated 6059, and a slight modification of the Multimet alloy N-155. Aging was studied with the help of X-ray diffraction, stress-rupture testing, microscopic examination, the dilatometer and magnetometer, and measurement of electrical resistivity. Rates of precipitating reactions at temperatures ranging from 1000 to 1650° F. were also studied. The effect of aging on mechanical properties was evaluated by means of stress-rupture testing.

18c-7. Decarburization of Chrome Nickel Alloys by Their Surface Oxides in High Vacua and at Elevated Temperatures. E. A. Gulbransen, W. S. Wysong, and K. Andrews. *Metals Technology,* v. 15, Sept. 1948, T.P. 2438, 14 pages.

The phenomenon was studied between 800 and 925° C. on an alloy containing 80% Cr and 20% Ni. The reaction begins at 840° C. and increases rapidly with temperature. Energy of activation was calculated. Relationships of reaction rates to oxide-film thickness and to presence of a hydrogen atmosphere. The shape of the weight-loss curves indicates that two reactions are involved: reaction of surface oxides with carbon in solid solution; and reduction of oxide inclusions by carbon, termed "internal decarburization." The latter occurs at the oxide-gas interface. 15 ref.

18c-8. Thermal Hardening of Cadmium Crystals. A. H. Cottrell and D. F. Gibbons. *Nature,* v. 162, Sept. 25, 1948, p. 488-489.

Literature and experimental results with regard to effect of atmosphere and variations of upper yield point and angle between the axis of the applied load and the slip plane. Compares thermal hardening of Cd with that of Fe.

18c-9. Time-Temperature Relationships in the Annealing of Copper-Base Alloys. A. L. Simmons. *Transactions of the American Society for Metals,* v. 41, 1949, p. 1440-1451.

Results of grain size and hardness determinations after annealing seven alpha copper-base alloys (copper, three Cu-Zn alloys, and three nickel silvers) for periods up to 5 hr. following reductions by cold rolling of 30 and 50%.

18d—Light Metals

18d-1. The Use of the Jominy Test in Studying Commercial Age Hardening Aluminum Alloys. Blake M. Loring, William H. Baer, and George M. Carlton. *Metals Technology,* v. 15, Feb. 1948, T. P. 2337, 9 pages.

It was found that the modified L-type Jominy specimen offers a convenient means for investigating effects of cooling rate on age-hardening phenomena which is important for alloys to be used in heavy sections. An apparent critical rate of quenching was noted in all of the alloys investigated. With the exception of the 75 S-T alloy, the widely different rates of cooling used had little effect on the hardness attained on aging.

18d-2. Heat Treatment of Aluminum Alloy Die Castings. R. A. Quadt. *Die Castings,* v. 6, Feb. 1948, p. 36-42.

Improvement in mechanical properties by solution treating and aging. Expansion of gas entrapped during casting is probable cause of pimpling and distortion on solution treating. Recommendations for proper gating to minimize air inclusions. (To be continued.)

18d-3. Heat Treatment of Aluminum Alloy Die Castings. Part 2. (Concluded.) R. A. Quadt. *Die Castings,* v. 6, March 1948, p. 37-38, 52-54.

Heat treatment to obtain dimensional stability, to relieve stresses, and to improve machinability. Effect on mechanical properties. It is shown that Al die castings can be heat treated successfully.

18d-4. Step Aging of a Magnesium-Base Casting Alloy. E. J. Vargo and G. Sachs. *American Foundrymen's Association, Preprint* No. 48-3, 1948, 7 pages.

The tensile strength of the Mg-base alloy AZ63 in the solution heat treated and aged condition was commercially found to be slightly lower than that in the solution-heat treated condition, in contrast to Specification AN-M-36. This discrepancy is explained on the basis of the stress-strain curves for the two conditions and the fact that commercial quality is slightly inferior to that obtainable in the laboratory. Properties of test bars were

determined after aging at various temperatures and also after "step aging", first at 250 and then at 350 or 400° F. Strength and elongation can be raised for a given aging time and aging time can be reduced significantly for a given combination of properties by replacing regular aging with step aging.

18d-5. Nature of Hardness and of the Process of "Strengthening" of Metals and Alloys. (In Russian.) S. T. Kishkin and R. L. Petrusevich. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Jan. 1948, p. 87-96.

It was found that the hardening of aluminum in the process of aging following tempering depends, not on peculiarities of initial structure, but upon "strengthening" induced by formation of highly displaced particles of a new phase during plastic deformation. These particles block the slip planes in a manner analogous to the action of martensite in steel.

18d-6. Reduction of Quenching Stresses in Wrought Aluminum Alloys. B. W. Mott. *Metal Treatment,* v. 15, Spring 1948, p. 14.

Methods by which a compromise can be effected between the demands for high mechanical properties and for the avoidance of undue quenching stresses.

18d-7. Le Traitement Thermique De Reversion. (Thermal Treatment of "Reversion".) Raymond Chevigny and Robert Syre. *Revue de l'Aluminium,* v. 25, March 1948, p. 93-96.

The term "reversion" refers to the brief ductile period observed in light alloys immediately after quenching. Principal characteristics of this phenomenon and its application to various nonferrous alloys.

18d-8. Uber den Einfluss des Magnesiumgehaltes auf die Kaltaushartung und Ruckbildung der Kaltaushartung von Aluminium-Kupfer-Magnesium-Legierungen. (Effect of Magnesium on Age Hardening and Stress-Relief Annealing of Cu-Mg-Al Alloys.) Karl-Ludwig Dreyer. *Metall,* Sept. 1947, p. 3-8.

The effect of aging, Mg content, temperature, and heat treatment on the hardness of various alloys. The Cu content was 3.7-4.0%, and the Mg content was varied from zero to 2.02%.

18d-9. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, Aug. 1948, p. 96-99, 226, 228, 230, 232.

Various forms of heat treatment for improving physical properties. (Based on a survey conducted by the Foundry Division of the Aluminum Association.)

18d-10. Uber die Warmaushärtung von Aluminium-Zink-Magnesium-Knetlegierungen. (High-Temperature Age Hardening of Aluminum-Zinc-Magnesium Malleable Alloys.) Walter Bungardt and Victor Hauk. *Metallforschung,* v. 2, June 1947, p. 161-168.

Effect of the quenching temperature on the age hardening of fine Al-Zn-Mg alloys at room and elevated temperatures. It was found that the rate of heating affected the age hardening process of the alloys, depending on their Mn and Si contents.

18d-11. Einfluss einer thermischen Vorbehandlung auf die Korngrösse von ausgehärteten Blechen einer Legierung der Gattung Al-Cu-Mg nach kritischer Verformung. (Effect of a Preliminary Heat Treatment, After Critical Working, on the Grain Sizes of Hardened Sheets of an Al-Cu-Mg Alloy.) Guido Bassi. *Metallforschung,* v. 2, June 1947, p. 191-192.

Treatment will prevent grain growth.

18d-12. Observations on the Annealing Characteristics of an Aluminium-Copper-Magnesium Alloy. Maurice Cook and T. Ll. Richards. *Journal of the Institute of Metals.* v. 74, July 1948, p. 583-597.

Isochronal annealing curves of a 4%-Cu, 0.7%-Mg aluminum alloy show, after a slight initial hardening with increasing temperature, softening in two distinct stages, followed by an increase in hardness. A study of the influence of rolling and annealing conditions revealed that the initial hardening is associated with age hardening and that the two softening stages are accompanied by two structural changes, corresponding to recovery and recrystallization and confirming the belief that softening on annealing is a two-stage process. The curve for the alloy in the nonaging condition shows a lowering of the recrystallization temperature and no initial hardening.

18d-13. Tempering Oils for Aging 75 S Aluminum Alloys. S. H. Phillips. *Industrial Heating,* v. 15, Sept. 1948, p. 1488, 1490, 1492, 1494, 1496, 1498.

Recommended equipment and oils. Meanings of the various temper designations: 75 SO, 75S-AQ, 75 SW, and 75 ST, and pointing out the difference between 75 ST and 24 ST.

18d-14. Conditions de recuit des alliages Al-Mg en métaux purs pour la décoration. (Conditions of Heat Treatment for Al-Mg Alloys Made From Pure Metals for Decorative Purposes.) J. Hérenguel and M. Scheidecker. *Métaux & Corrosion,* v. 23. July-Aug. 1948, p. 167-174.

Alloys should be treated to produce a fine-grained structure or perfectly homogenous solid solution prior to electrolytic polishing followed by surface treatment for specific decorative effects. Optimum conditions for heat treatment and hot and cold working to obtain the desired structure.

18d-15. Effect of Room Temperature Intervals Between Quenching and Aging of Aluminum Sand Casting Alloys. R. A. Quadt. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 351-355; discussion, p. 355-356.

Appeared as Preprint 47-27. Previously abstracted from *American Foundryman,* v. 11, June 1947, p. 39-43. See item 18-126, 1947.

SECTION XIX

WORKING

19a—General

19a-1. Back-Pull Wire Drawing; A Critical Review of Literature. J. G. Wistreich. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 417-428.

The salient features of drawing with back pull; basis for further research. 14 ref.

19a-2. The Light-Section Mill at the Darlington Works of the Darlington and Simpson Rolling Mills, Ltd. *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 447-452.

Plant is intended for production of standard window-frame sections and similar small shapes.

19a-3. Lubrication in Drawing Operations. E. A. Evans, H. Silman, and H. W. Swift. *Engineering,* v. 164, Nov. 14, 1947, p. 477-479.

Previously abstracted from *Sheet Metal Industries.* See 21-99 and 21-107, R.M.L., v. 4, 1947 *(Metals Review,* Dec. 1947). For first installment in *Engineering,* see 21-109, R.M.L., v. 4, 1947 (*Metals Review,* Jan. 1948).

19a-4. A Correspondent Examines Wire Liming. Suggestions for Improvement. *Wire Industry,* v. 14, Dec. 1947, p. 688.

The lime coat on rods and wire has three purposes: neutralizing acid remaining on the material after washing; sealing the undercoat; and acting as a lubricant carrier during the drawing operation. Limitations, mode of application, use of glycerine, and use of other compounds.

19a-5. Forging and Forming. *Steel,* v. 122, Jan. 5, 1948, p. 198, 200.

Brief reviews of new developments: Wider Use of Die Forgings Decreases Product Costs, by Waldemar Naujoks; User's Press Problems Studied to Gain More Hourly Output, by R. E. Dillon; Larger, Faster Equipment Built by Press Industry, by John F. Herkenhoff; New Tools Boost Expansion of Sheet Metalworking Plants, by J. T. Dillon, Jr.; Holds Stamping Answer to Low-Cost Mass Production, by Sam Morrison; Heat Resistant Stainless Alloys Forged Succesfully, by C. H. Smith, Jr.; Erection of Record Size Tanks Creates Added Welding Problems, by Fred L. Plummer; Stamping Industry to Feel Steel Shortage Until Late 1948, by Tom J. Smith, Jr.; Forging Developments to Benefit Many Manufacturers, by R. H. Jones.

19a-6. Forging the Stainless Metals. Waldemar Naujoks. *Steel Processing,* v. 33, Dec. 1947, p. 735-737.

The four general types of stainless forging metals; forging techniques; forging design; selection factors.

19a-7. Automatic Transfer Method for Stamping Parts at High Rate. *Automotive Industries,* v. 98, Jan. 15, 1948, p. 27.

Method developed by AC Spark Plug Div., General Motors Corp.

19a-8. Hand Curling and Bending Tool. J. C. Murgatroyd. *Machinery* (London), v. 71, Dec. 18, 1947, p. 705.

Home-made tool.

19a-9. Dies for Forming Metal Along Natural Flow Lines. *Machinery* (London), v. 71, Dec. 25, 1947, p. 715-718.

New design technique known as "Sol-A-Die" and its application to the forming of unusual shapes, such as used in aircraft exhaust manifolds.

19a-10. Wire Mill Practice No. 2. Principles of Wiredrawing. W. F. G. Kerley. *Wire Industry,* v. 14, Dec. 1947, p. 683-684.

Some practical examples. (To be continued.)

19a-11. Forging Die Design; the Bulldozer. John Mueller. *Steel Processing,* v. 34, Jan. 1948, p. 17-19, 35.

The "bulldozer" is a metal-forming machine, designed for bending and forming, and particularly adapted to making deep bends, because of the long stroke and accessible die space. Equipment and procedures for its use on various types of work.

19a-12. Lubricant in Deep Drawing. A. H. Stuart. *Light Metals,* v. 11, Jan. 1948, p. 45-48.

The mechanics and physics of various media employed in commercial practice, with special reference to the virtues of colloidal graphite.

19a-13. Regulator Bodies and Caps Can Be Made Out of Bar Stock; But the Modern Die Forging Is Vastly Superior. *Weld,* v. 4, Jan. 1948, p. 17.

Refers to regulators for compressed gases, such as those used in welding.

19a-14. Die-Less Duplicating—a New Technique for the Sheet Metal Worker. G. H. Danielson. *Sheet Metal Worker,* v. 39, Jan. 1948, p. 96-98.

Use of simple hand-operated machines known as "Di-Acro" for bending, notching, forming, perforating, shearing, slitting. Said to be of especial value to the small job shop.

19a-15. Difficult Forming Problems Solved With the Metal Stretching and Shrinking Machine. R. Smith. *Sheet Metal Industries,* v. 25, Jan. 1948, p. 131-134, 142.

Machine developed in the U. S. and its applications.

19a-16. Berechnung der Beim Walzen Auftretenden Kräfte und der Walzarbeit im Lichte der Versuchsergebnisse. (Calculation of the Forces Occurring During Rolling and the Effect of Rolling in the Light of Experimental Data). A. Geleji. *Schweizer Archiv,* v. 13, Nov. 1947, p. 336-344.

Formulas for the simplest case where side pressures do not interfere and where square bars are rolled.

19a-17. The Extrusion Molding Process. H. B. Cook. *Iron Age,* v. 161, Jan. 29, 1948, p. 62-69; Feb. 5, 1948, p. 79-86, 134. Based on research records of Charles C. Misfeldt.

Particular emphasis on development and application of process, and its potentialities as a production medium for gas-turbine parts. Various other metal-shaping techniques compared with extrusion molding. Interesting possibilities of Be-Ni-Cu alloys, extrusion molded, for high-temperature service, and the desirbility of more extensive use of proportional limit values for design purposes. How use of heat resistant materials establishes limitations on operating temperatures of jet engines which restrict their power efficiency. Construction and operation of an extrusion molding machine.

19a-18. Manufacture of Diamond Tools and Their Application in Germany. (Continued.) *Industrial Diamond Review,* v. 8, Jan. 1948, p. 7-15. Reprinted from B.I.O.S. Report No. 1448. **The German Industrial Diamond Industry,** by G. J. Trapp, R. P. Eccles, P. Grodzinski, H. E. Jones, R. E. Leeds, N. Robinson, N. R. Smith, and D. B. Vallance.

Diamond truing tools, and reports on procedures of various wire-drawing works. Dental tools and diamond powder. 19 ref. (To be continued.)

19a-19. Designing of "Trouble-Free" Dies. Part LXXVII. Modern Trends in Safety First Appliances. C. W. Hinman. *Modern Industrial Press,* v. 10, Jan. 1948, p. 22, 40.

Safety guards of various types, for use on power presses.

19a-20. Jobber Can Serve Metalworking Needs of Many Industries. Walter Rudolph. *Modern Industrial Press,* v. 10, Jan. 1948, p. 28, 32, 34.

Metal-forming and welding equipment and procedures used at Wm. J. Meyer Co., Rochester, N. Y., a typical job shop.

19a-21. Metal Spinning of Sheet Products. Italo Adamis. *Western Machinery and Steel World,* v. 39, Jan. 1948, p. 70-73.

19a-22. Press Work. *Western Machinery and Steel World,* v. 39, Jan. 1948, p. 81.

Manufacture of price-tag holder.

19a-23. Future Trends in Machinery and Dies for the Wire Trade. N. Davidson. *Wire Industry,* v. 15, Jan. 1948, p. 37-41.

19a-24. The Practical Aspects of Metal Spinning. Robert J. Schneider. *Iron Age,* v. 161, Feb. 12, 1948, p. 76-80, 133-134.

The advantages and limitations of spinning, and where the technique can be most profitably applied. Metals which can be spun, spinning techniques and equipment, tolerances, control of dimensions, flow of the metal, and design considerations.

19a-25. Forming Metal Shapes by Cold Rolling. E. J. Vanderploeg. *Machinery* v. 54, Feb. 1948, p. 153-158.

Types and construction of roll forming machines and accessory equipment required for the fabrication of various shapes. (First of a series.)

19a-26. Die Set Problem Solved. Edward Diskavich. *Production Engineering & Management,* v. 21, Feb. 1948, p. 75.

A production problem encountered in connection with punching small holes in metal was solved by processing the die set diagrammed, by

19a-27. Procedures for Drawing Flanged Shells. James Walker. *Tool Engineer,* v. 19, Jan. 1948, p. 37-42.

Concluding of a series on drawing die problems and formulas.

19a-28. Practical Problems of Light Presswork Production. (Continued). J. A. Grainger. *Sheet Metal Industries,* v. 25, Jan. 1948, p. 99-102.

Various types of power shears. (To be continued.)

19a-29. The Production of a U-Shaped Component From Thin Strip. V. Sutton. *Machinery* (London), v. 72, Jan. 22, 1948, p. 107.

Simple press tool.

19a-30. Die for Forming Clip. L. Kasper. *Machinery* (London), v. 72, Jan. 22, 1948, p. 119-120.

Described and diagrammed.

19a-31. Emulsifying Agents for Metalworking; German Practice in Manufacture and Use. P. D. Liddiard. *Metal Treatment,* v. 14, Winter 1947-48, p. 241-242.

A critical survey of B.I.O.S. Miscellaneous Reports No. 11 and 12.

19a-32. Die for Forming Irregular-shaped Spring. *Machinery* (London), v. 72, Jan. 29, 1948, p. 144.

19a-33. Multi-Punch and Man-Hours. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 101.

Time-saving applications of simultaneous punching of up to 80 holes of various sizes in a sheet-metal shop.

19a-34. Die-Grams. Karl L. Bues. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 124-125.

How to produce strap having two screw holes and four right-angle bends in one, two, or three operations.

19a-35. Metal Spinning. I. A. Shepard. *Modern Metals,* v. 4, Feb. 1948, p. 28-29.

Use for short production runs, pilot runs, experimental and sample work, and finally for long production runs where the shell is so designed that press tooling becomes excessively costly and the unit cost prohibitive.

19a-36. Improved D.C. Generators for Reversing Mills. C. Lynn and W. H. Burr. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 45-49; discussion, p. 50-55, 70.

Laminated steel generator frames, instead of the usual solid design, will give better operation of reversing mill d.c. generators during transient load changes. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 22, 1947.)

19a-37. Designing of "Trouble-Free" Dies. Part LXXVIII. Classification and Installation of Presses. C. W. Hinman. *Modern Industrial Press,* v. 10, Feb. 1948, p. 20.

19a-38. The Inspection and Maintenance of Diamond Wire Drawing Dies. *Wire and Wire Products,* v. 23, Feb. 1948, p. 140-143.

The information presented was issued by a Technical Committee consisting of die users and makers at the request of the Council of the British Diamond Die Federation.

19a-39. Closely Controlled Forming Operations Used to Fabricate Copper-Bottom Stainless Containers. Gerald Eldridge Stedman. *Steel,* v. 122, March 1, 1948, p. 102, 104, 126, 128.

Equipment and procedures.

19a-40. A Calculation of Internal Stresses Due to Cold Extension or Compression. H. Brandenberger. *Engineers' Digest,* v. 5, Feb. 1948, p. 67-70. Translated and condensed from *Schweizer Archiv,* v. 13, Aug. 1947, p. 232-238; Sept. 1947, p. 268-275.

Previously abstracted from original source. See R.M.L., v. 4, 1947, items 19-387 and 19-451.

19a-41. Determinacao do Motor e do Volante dos Trens de Laminacao. (Design of Motors and Flywheels of Rolling Mills.) Jose Rossi, Jr., and Joaquim I. de Compos Nobrega. *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 684-705.

Operating diagrams were used as the basis of study of problem of design of motors and fly wheels. The effect of control and lubrication on power required. The calculation is illustrated by a specific example.

19a-42. Errors in Determination of Specific Pressure by Means of the Crushing Method. (In Russian.) D. I. Suyarov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Dec. 1947, p. 1497-1499.

The deformation of materials during crushing or forming. Direct graphic differentiation seems to produce better results than the method proposed by Pomp and Houben. However, values in the initial part of the curve are shown to be unreliable by means of experiments on impact upsetting (forming) of lead.

19a-43. The Rolling of Metals: Theory and Experiment—Part XV. Discussion of Certain Practical Rolling Problems in the Light of the Theory of Rolling. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 297-302, 308.

This installment is devoted to roll shape, or camber, and its effects. (To be continued.)

19a-44. The Care and Maintenance of Press Tools. W. M. Halliday. *Sheet*

Metal Industries, v. 25, Feb. 1948, p. 351-353.

First of a series dealing with some important features of press tool design, and with the operating factors and maintenance essential to ensure smooth, trouble-free production service and economy in use. (To be continued.)

19a-45. Drawing Lubricants. W. J. Haring. *Steel Processing,* v. 34, Feb. 1948, p. 84-87.

Chemistry of drawing lubricants. (Presented at meeting of New England District Pressed Metal Institute, Jan. 13, 1948.)

19a-46. A Theoretical Analysis of the Stresses and Strains in Extrusion and Piercing. R. Hill. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 177-185.

Power consumption and distribution of stress and strain in extrusion and piercing are calculated from the equations of plastic flow developed by Hencky and Geiringer. Determination of the shape of the plastic region and the motion of individual elements is an essential part of the analysis, and distinguishes it from all earlier theories. Pressures of extrusion and piercing are evaluated for both square and conical dies over a wide range of reductions in area and frictional conditions. The deformation of a square grid scribed on a longitudinal section is calculated in the case of inverted extrusion with 50% reduction. 11 ref.

19a-47. Use of Rubber Dies for Blanking Thin Laminations. *Machinery* (London), v. 72, Feb. 12, 1948, p. 216. Based on B.I.O.S. Report No. 1527.

German methods. Pure Ni and an alloy of 91% Fe and 9% Al were used. Suitable for material 0.004 to 0.012 in. thick.

19a-48. Ingenious Die Design Increases Versatility of Press Brake. W. Earl Peters. *Machinery,* v. 54, March 1948, p. 168-175.

A wide variety of designs for miscellaneous applications.

19a-49. Tungsten Carbide Blanking Dies. E. J. Reitler and C. R. Harmon. *Tool Engineer,* v. 20, March 1948, p. 47-49.

Trend toward more use of carbides. Recommended designs.

19a-50. 50% to 1000% Production Increases Possible With Automatic Feeding of Progressive Dies. C. A. Hollister. *Machine and Tool Blue Book,* v. 44, March 1948, p. 171-172, 174, 176, 178, 180, 182, 184, 186.

Increased output, less operator fatigue, elimination of die damage, and increased safety for operators, are among the advantages of automatic die feeding. Correct die design for varying die and press problems.

19a-51. Press Lines Speed Flow of Parts for Ford Lamp Assemblies. P. D. Aird. *Modern Industrial Press,* v. 10, March 1948, p. 13-14, 18, 24.

19a-52. Designing of "Trouble-Free" Dies. Part LXXIX. Classification and Installation of Presses. C. W. Hinman. *Modern Industrial Press,* v. 10, March 1948, p. 20, 51.

19a-53. Designing Rolls for Cold Roll Forming. E. J. Vanderploeg. *Machinery,* v. 54, March 1948, p. 176-180.

Methods for machining each pass for cold forming rolls and materials used in making the rolls. (To be continued.)

19a-54. How to Get the Most Out of Punch Presses. Part I. C-Frame Presses. Part II. Double-Crank, Straight-Side Presses. E. H. Girardot. *American Machinist,* v. 92, Feb. 26, 1948, p. 79-82; March 11, 1948, p. 174-177.

Beginning of a series based on an extensive study of the various forms of presses. (To be continued.)

19a-55. Electrical Applications in the Wire Industry. J. G. Roby. *Wire and Wire Products,* v. 23, March 1948, p. 213-220, 265-266.

Different types of wire-drawing machines and the electrical drives for each.

19a-56. Carbide Dies Cut Costs. *Business Week,* March 13, 1948, p. 58-60.

Wartime development and its advantages and uses in presswork.

19a-57. Hydraulics and the Tangent Bender. Lee B. Green. *Applied Hydraulics,* v. 1, Feb. 1948, p. 28-29, 32.

Application of hydraulic power to a production machine for edge and stretch bending and radial forming of metal sheets, structurals, and tubes.

19a-58. Lubrication in Drawing. T. Waterfall. *Machinery Lloyd* (Overseas Edition), v. 20, Feb. 28, 1948, p. 103-105.

19a-59. The Rolling of Metals: Theory and Experiment—Part XVI. A Survey of Present Knowledge and the Direction of Future Research. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 25, March 1948, p. 497-502.

Qualitative and quantitative use of the "friction hill" theory of rolling and the present state of knowledge and discussion of useful avenues for further research, particularly from the viewpoint of the rolling-mill designer and operator. (To be continued.)

19a-60. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries*, v. 25, March 1948, p. 511-516.

This installment covers squaring, circle cutting, and other operations; trimming on the lathe; a cutter for heavy trimming; and a trimming mandrel. (To be continued.)

19a-61. The Shaping of Metals. Francis W. Boulger. *Metals Review*, v. 21, March 1948, p. 3, 5, 7.

Progress in hot working, cold forming, and machining based on an analysis of the past year's Technical Literature. References to "A.S.M. Review of Current Metal Literature".

19a-62. Solving Punch Press Problems Economically. H. J. Chamberland. *Western Machinery and Steel World*, v. 39, March 1948, p. 96-99.

Cost-saving advantages of lightweight, small-sized presses for small parts. Prior to World War II, it was common practice to use heavy machinery for small jobs, such as use of a 30-ton press to blank disks the size of silver dollars. Selection of punch-press sizes suitable, but not unnecessarily large, for the job to be done.

19a-63. Wire Netting Industry; Fast Small Mesh Machines. *Wire Industry*, v. 15, March 1948, p. 181. Condensed from B.I.O.S. Report No. 1288.

Results of inspection of four German plants for manufacture of wire netting.

19a-64. Profile of Wire-Drawing Dies; New Checking Method. J. G. Wistreich. *Wire Industry*, v. 15, March 1948, p. 171.

Development of improved method using a dental compound known as "Zelex" to check die shapes to production standards.

19a-65. Presses and Tools. *Metals Review*, v. 21, March 1948, p. 9, 11, 13, 15, 17, 19, 21, 23.

New equipment for shaping and cutting of metals, introduced during the past year.

19a-66. Progressive Die Design. Part III. C. W. Hinman. *Modern Machine Shop*, v. 20, April 1948, p. 142-144, 146, 148, 150.

Construction of a "cut-and-carry" progressive die.

19a-67. The Theory of "Unit Compressive Stress" of Metals During Drawing. (In Russian.) S. I. Gubkin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R. Section of Technical Sciences), Dec. 1947, p. 1663-1681.

According to the theory proposed, the energy involved in wire-drawing operations may be divided into that used for "basic" deformation, "additional" deformation and that required to overcome frictional forces. Formulas for calculation of these values.

19a-68. Grafisk Valskalibrering. (Graphic Roll Pass Designing.) Gunnar Wallquist. *Jernkontorets Annaler*, v. 132, no. 2 1948, p. 27-41.

Method of calculation based upon certain linear dimensions instead of area relations. The dimensions are calculated by use of diagrams, based on experience with different rolling conditions. Application to some very common types of rolling, i. e. rolling of billets in diamond passes, and guide rolling of round bars with alternating square and round passes in the strand rolls. The designing of series for the rolling of square, hexagon, octagon and other simple sections. For other than round sections, graphic designing according to the comparative and the logarithmic method.

19a-69. Rolling Mills; Methods of Roll Load and Power Calculation. L. R. Underwood. *Metal Industry*, v. 72, Feb 27, 1948, p. 166-169; March 5, 1948, p. 187-190; March 19, 1948, p. 231-234.

Principal methods and their relative merits and defects. 26 ref. (Presented at meeting of Institution of Mechanical Engineers.)

19a-70. A Critical Survey of Wire-Drawing Theory. G. D. S. MacLellan. *Journal of the Iron and Steel Institute*, v. 158, March 1948, p. 347-356.

Theories relating to determination of stresses during drawing. Errors and inconsistencies in many of these theories, and the more significant contributions. Some ways of testing those theories which give results in reasonable agreement with experience are considered, and attention is drawn to some of the more important conclusions which can be drawn from them. 31 ref.

19a-71. Back-Pull Wire Drawing; A Critical Review of Literature. (To be continued.) J. G. Wistreich. *Wire Industry*, v. 15, March 1948, p. 177-180.

Previously abstracted from *Journal of the Iron and Steel Institute*, v. 157, Nov. 1947, p. 417-428. Item 19a-1, R.M.L., 1948.

19a-72. Drawing Thin-Walled Shells of Intricate Shape. D. A. Baker. *Machinery* (London), v. 72, March 18, 1948, p. 363-366.

The problems involved illustrated

by an example of the drawing of a radio-tube part of Armco iron, to limits of ± 0.003 in., which involved three types of drawing problems. Methods.

19a-73. Shot-Peening Equipment. R. Ankers. *Machinery* (London), v. 72, March 25, 1948, p. 400-401. Condensed from "Developments in Shot-Blasting" read recently before Manchester Association of Engineers.

Equipment and methods.

19a-74. The Institute of Metals. *Engineering*, v. 165, March 26, 1948, p. 304-305.

Begins extended condensation of papers presented at annual general meeting, March 16-18, 1948. Calculation of Loads Involved in Metal Strip Rolling, by M. Cook and E. C. Larke; Hot Shortness of Some High-Purity Alloys in the Systems Aluminum-Copper-Silicon and Aluminum-Magnesium-Silicon, by P. H. Jennings, A. R. E. Singer, and W. I. Pumphrey; and A Consideration of the Constitution of Aluminum-Iron-Silicon Alloys and Its Relation to Cracking Above the Solidus, by P. H. Jennings and W. I. Pumphrey. (To be continued.)

19a-75. Development of Low Weight Forgings. J. H. Friedman. *Steel Processing*, v. 34, April 1948, p. 183-190, 192.

Low-weight forgings as referred to in this paper are forgings that have been designed and produced so as to reduce scrap loss in the form of crop ends, flash trimmings, and machining chips to a minimum. Parts to which the design principles were applied.

19a-76. Versatile Applications of the Press Brake. W. Earl Peters. *Machinery*, v. 54, April 1948, p. 143-150.

Use of several types of power-operated press brakes. Materials that can be formed, tolerances maintained, and operations possible.

19a-77. The Design and Function of a Sliding Cone Punch. Louis J. Lovisek. *Tool Engineer*, v. 20, April 1948, p. 21-24.

Many uses in cold forging. The two types in common use are the "hit" and the "free" types.

19a-78. Progressive Die Slashes Tooling. *American Machinist*, v. 92, April 8, 1948, p. 86-87.

Nine-station progressive die to produce terminals for fluorescent-lamp sockets. In original production, several dies and machining operations were required. Present setup combines 17 operations on two parts at a time at a rate of 1400 parts per min. Scrap totals only 0.0818 sq. in. per part.

19a-79. Kirksite Dies for Auto Stampings. Walter G. Patton. *Iron Age*, v. 161, April 15, 1948, p. 78-81.

Use soft nonferrous alloy for short-run or pilot production of sheet-metal parts for automobiles, commercial trucks, buses, and trailers, and methods for their production. They are made by a casting process using plaster models. Vacuum is used in casting the smaller dies.

19a-80. Selecting Drawing Lubricants; Determining Factors to Consider. W. J. Haring. *Steel*, v. 122, April 19, 1948, p. 86, 88, 91.

Some of the many variables that should be considered in choosing drawing compounds. (Presented at New England district meeting, Pressed Metal Institute, Jan. 13, 1948.)

19a-81. Some Problems in Rolling. H. Ford. *Iron and Steel Institute, Special Report* No. 39, "Reports of the Affiliated Local Societies", Dec. 1947, p. 7-27.

Orowan's theory of the deformation process in relation to previous theories and concepts and to experimental rolling tests. Results for aluminum and for steel show that, for cold rolling, the simple theory of Ekelund gives values of roll force which agree very closely with those obtained by Orowan's theory, while both can be made to agree reasonably well with experimental values under certain conditions. In hot rolling, there is insufficient experimental evidence from which to draw definite conclusions, but the new theory is believed definitely superior to old ones. (Presented at a meeting of Swansea and District Metallurgical Society, Swansea, England, Feb. 23, 1946.)

19a-82 Some Notes on Rolling-Mill Practice. G. Foster. *Iron and Steel Institute, Special Report* No. 39, "Reports of the Affiliated Local Societies", Dec. 1947, p. 49-58.

Principles of the rolling of shaped sections. The stages in an ingot's journey through a section-rolling mill. Abnormalities in the heating of ingots, together with their effect on cogging-mill practice. Difficulties encountered in the production of blooms. Principles used in the production of some of the more common structural shapes, and various methods for producing the same shape. Advantages and disadvantages of two different methods for producing joists.

19a-83. Expansion of Press Equipment Speeds Stamping Output at Active Tool & Mfg. Co. Plants. P. D. Aird. *Modern Industrial Press,* v. 10, April 1948, p. 13-14, 16, 20, 24, 36.

19a-84. Designing of "Trouble-Free" Dies. Part LXXX. Computing Press Capacities and Blanking Pressures. C. W. Hinman. *Modern Industrial Press,* v. 10, April 1948, p. 26.

19a-85. G. G. Greene Mfg. Corp. Expands in Metal Stamping Field. Walter Rudolph. *Modern Industrial Press,* v. 10, April 1948, p. 38, 40.

Procedures and equipment in production of a varied line of household stampings.

19a-86. Efficient Press Department Produces New Strato Ships, Howard E. Jackson. *Modern Industrial Press,* v. 10, April 1948, p. 46, 48, 50.

Pressing operations and equipment for production of Boeing planes.

19a-87. Strain Measurements in Deep Drawing. K. L. Jackson. *Sheet Metal Industries,* v. 25, April 1948, p. 723-724.

A method for evaluation of blank profiles of almost any shape, which does not require a knowledge of the intricacies of plastic deformation. This is done by attaching photogrids directly to the unformed blank.

19a-88. Development of Residual Stresses in Strip Rolling. R. McC. Baker, R. E. Ricksecker, and W. M. Baldwin, Jr. *Metals Technology,* v. 15, April 1948, T. P. 2333, 18 pages.

Residual stresses in rolled strip, expressed as a fraction of yield strength, are directly proportional to the square of the ratio of strip thicknesses to contact length between the roll and strip. This relationship appears to be unaffected by the magnitude of reduction per pass. Results have been extended to such practical rolling problems as firecrackering and alligatoring. 15 ref.

19a-89. How and When to Swage. Anderson Ashburn. *American Machinist,* v. 92, April 22, 1948, p. 77-84.

A special report. Advantages and limitations, and current practice.

19a-90. The Effect of Friction on the Change of Shape of Forgings. I. Y. Tarnovsky. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 142-144. Translated and condensed from *Vestnik Inzhenerov i Tehnikov* (Bulletin of Engineering and Technology), no. 9-10, 1946, p. 291-295.

A theoretical, mathematical development.

19a-91. How to Get the Most Out of Punch Presses. Part III. Efficient Use of Material. Part IV. Piercing and Blanking Methods. Part V. Die Design. Part VI. Details of Die Design. (Concluded.) E. H. Girardot. *American Machinist,* v. 92, March 25, 1948, p. 108-111; April 8, 1948, p. 116-119; April 22, 1948, p. 86-89; May 6, 1948, p. 114-117.

In Part III numerous diagrams and text show principles of economical part design for various typical parts. In Part IV, the advantages and disadvantages of various piercing and blanking methods are discussed and clarified by diagrams. Part V discusses design principles. Numerous diagrams. Part VI shows standard designs for die details not previously covered.

19a-92. Hydraulic Stretch Forming Machine. *Sheet Metal Industries,* v. 25, April 1948, p. 766-767.

Machine used in the U. S. for fabrication of jet aircraft components.

19a-93. Induction Heating for Steel Forging Can Reduce Costs. Kenneth Rose. *Materials & Methods,* v. 27, April 1948, p. 76-80.

Production advantages and disadvantages. How to reduce costs and increase efficiency.

19a-94. Factors in the Operation of a Mannesmann Piercing Mill. H. R. McLaren. *Iron and Steel Engineer,* v. 25, April 1948, p. 73-77; discussion, p. 78-81.

(Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 22, 1947.)

19a-95. Wales Sheet Metal Fabricator for Punching, Nibbling, Forming, Notching, Bending, Blanking. *Tool & Die Journal,* v. 14, May 1948, p. 98-100.

19a-96. Auxiliary Equipment for Cold Roll-Forming. E. J. Vanderploeg. *Machinery,* v. 54, May 1948, p. 170-173.

Operation of cutoff machines, rotary slitting machines, and tube welding mills.

19a-97. Note on a New Method for Checking the Profile of Wire-Drawing Dies. J. G. Wistreich. *Journal of the Iron and Steel Institute,* v. 158, April 1948, p. 496.

Results of tests with the dental compound Zelex which show that it is very suitable for checking die shapes to production standards, since it reproduces the shape reasonably accurately and since the technique is extremely simple.

19a-98. The Rolling of Metals. Theory and Experiment—Part XVI. A Survey of Present Knowledge and the Direction of Future Research. (Concluded.) L. R. Underwood. *Sheet Metal Industries,* v. 25, April 1948, p. 704-706, 716; May 1948, p. 917-921.

Lateral spread of the material; friction between the rolls and the material rolled; roll flattening; and experimental mills. Some information on instruments used in rolling-mill research and control, and for measurement of the various forces and other factors involved.

19a-99. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 25, April 1948, p. 719-722.

External and internal beading and curling; square flanging on the lathe; and setting the trimming and beading lathe. (To be continued.)

19a-100. Wire Drawing Problems—Drawing Solutions and Die Life. *Industrial Diamond Review,* v. 8, April 1948, p. 101-102.

Tests made on different solutions and suggestions on improving die life.

19a-101. Compound Blanking and Forming Die. *Machinery* (London), v. 72, April 15, 1948, p. 481-482.

19a-102. Mechanism for Operating Dial Feed and Radially Positioned Multiple Punches. C. F. Smith. *Machinery* (London), v. 72, April 15, 1948, p. 482-484.

19a-103. Wire Drawing. H. Richards. *Machinery* (London), v. 72, April 22, 1948, p. 510-514.

Various aspects in production of wire such as die design, die life, use of diamond dies, die lubrication and coatings. Wire-drawing practice.

19a-104. Influence of Rolling and Forging on the Mechanical Properties of Medium Carbon Steel. (In Russian.) M. V. Rastegaev. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Jan. 1948, p. 103-107.

Medium carbon steels used in production of railroad-car axles and connecting rods (0.32% C, 0.68% Mn, 0.26% Si, 0.035% S, and 0.027% P; and deoxidized with 250 g. of Al per ton), were investigated. Mechanical properties of rolled steel are better than those of forged steel after the same heat treatment, and structure of the former is more homogeneous.

19a-105. Get More From Your Press Brake. *Sheet Metal Worker,* v. 39, May 1948, p. 62-63.

First of a series on press-brake operations.

19a-106. Designing of "Trouble-Free" Dies. Part LXXXI. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, May 1948, p. 26.

19a-107. Northrop's Prosthetics Program Revolutionary. Charles Spencer Poe. *Modern Industrial Press,* v. 10, May 1948, p. 48, 50, 52.

Fabrication of prosthetic devices from various metals, alloys, and plastics. Press and machine-shop operations.

19a-108. Sheet and Tin Plate Mills; Measurement of Roll Camber. J. H. Mort. *Iron and Steel,* v. 21, May 1948, p. 147-149.

Description of methods.

19a-109. Internal Stresses in Metals. W. A. Wood and N. Dewsnap. *Nature,* v. 161, May 1, 1948, p. 682-683.

Two types of internal stress may arise in a metal during plastic deformation: first, irregular stresses which may be explained by the Heyn hypothesis of anisotropy and inhomogeneities of granular texture; and second regular internal stress, which is of special interest because it must be associated in a fundamental manner with the response of the metallic lattice to external stress.

19a-110. Internal Stresses in Metals. G. B. Greenough. *Nature,* v. 161, May 1, 1948, p. 683.

Various theories. It is believed that the hypothesis of a complex system of Heyn stresses is adequate.

19a-111. Metal Forming; The Function of the Lubricant During Fabrication. A. H. Stuart. *Metal Industry,* v. 72, May 7, 1948, p. 377-380.

Lubricant requirements. Graphite as an "ideal solid lubricant".

19a-112. Practical Ideas. *American Machinist,* v. 92, May 20, 1948, p. 116-120.

Bar-type reamer cuts smooth bore using hardened circular cutters, by G. R. Milner; winding of brass coil springs using drilled block, lathe, and arbor, by John J. Moffett; discussion of opinions of Edward Rautsch in a recent issue regarding reduction of tool-point widths when a threading job is moved from a lathe to a mill, by Carl A. Johnson; conversion of grinder to form arcs of long radius on bearing caps, by George Werner; use of flushpin gage to check an internal recess in a cylinder, by Glen Shopbell; 13-hook rig for transferring steel bars from furnace to quenching bath; turning rise on cams with templet-and-follower setup, by Burl Mansberger; use of drillpress in sharpening slitting saws, by H. Scala; ball center grips end of stock to permit cutting collars from brass tubing, by Allen B. Nixon; fixture for production bending of lever, by Charles H. Willey; cut-away section on stripper plate speeds hand feeding of

strip stock to press, by Arthur F. Hird; fixture for locating blind holes, by L. Kasper; and other miscellaneous shop hints.

19a-113. Pilots for Progressive Dies. *American Machinist,* v. 92, May 20, 1948, p. 127, 129, 131.
Various types.

19a-114. Sheet Leveler Incorporates New Feature. Thomas E. Lloyd. *Iron Age,* v. 161, May 20, 1948, p. 92-94.
A sheet leveler incorporating a solid-platen backup, instead of conventional backup rolls, and an endless-chain roll drive was used during the war for flattening silver chloride. Now used to flatten sheet steel for refrigerator cabinets.

19a-115. Progressive Die Design, Part V. C. W. Hinman. *Modern Machine Shop,* v. 21, June 1948, p. 144-146, 148, 150, 152.
Construction and operation of two dies—one for forming time-fuse escape levers and the other for producing double-edge razor blades.

19a-116. Forming Cookson Lock Joints. J. B. Clegg. *Machinery* (London), v. 72, May 20, 1948, p. 622-623.
The various press-brake operations involved in forming the joint.

19a-117. Strip Rolling. *Metal Industry,* v. 72, May 28, 1948, p. 446-447.
Application of hydraulic variable speed drives to a fully reversing four-high cold-strip rolling mill.

19a-118. Bath Contour Forming, a New Metalworking Process. *Automotive Industries,* v. 98, June 15, 1948, p. 32-33, 67.
New technique for making pieces difficult to produce economically by conventional methods, of both ferrous and nonferrous metals.

19a-119. How Colloidal Graphite Aids Metal Forming. G. C. Giles. *American Machinist,* v. 92, June 17, 1948, p. 143.
Directions for miscellaneous forming and lubrication operations.

19a-120. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 25, June 1948, p. 1145-1152.
Standardization in design by use of standard press charts. (To be continued.)

19a-121. Tooling for Cold Roll-Forming and Auxiliary Operations. E. J. Vanderploeg, *Machinery,* v. 54, June 1948, p. 172-176.
Roll-forming machines can be tooled to emboss, bevel, coil, curve, and to produce multiple sections of two or more materials. (Fourth of a series.)

19a-122. Precision "Stamping" on the Broaching Machine. *Tool Engineer,* v. 20, June 1948, p. 29.
Equipment for production of telephone-relay part.

19a-123. Fundamentals of Forging Practice. Waldemar Naujoks. *Steel,* v. 122, June 7, 1948, p. 100-102, 104, 129; June 21, 1948, p. 98-102.
First part is devoted to historical information. Second installment begins a highly practical discussion of how forgings are made, how best to utilize the established laws of metal flow, forgeability of metals, and the smith-forging method. (To be continued).

19a-124. Influence d'une déformation sur le pouvoir thermo-électrique des métaux. (Influence of Deformation on the Thermoelectric Properties of Metals) Charles Crussard and Francis Aubertin. *Comptes Rendus* (France), v. 226, Jan. 5, 1948, p.75-76.
By varying conditions such as grain size and rate of deformation, is was concluded that the thermoelectric effect of plastic deformation is induced by internal distortions which are much localized and submicroscopic.

19a-125. Influence d'un écrouissage homogene sur le frottement intérieur d'un solution solide. (Influence of Uniform Cold Working on the Internal Friction of Solid Solutions). Christian Boulanger. *Comptes Rendus* (France), v. 226, April 12, 1948, p. 1170-1171.
Investigated, using a paramagnetic solid solution, with a minimum amount of inclusions, and very low internal friction. Results indicate that no relationship exists between internal friction and elastic limit or hardness.

19a-126. Stampers Vitally Interested in Information Pertaining to Presses. E. A. Irwin. *Modern Industrial Press,* v. 10, June 1948, p. 6, 8, 48-49.
Recommended presswork procedures.

19a-127. Designing of "Trouble-Free" Dies. Part LXXXII. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, June 1948, p. 20, 34.

19a-128. Automatic Lubrication Helps Speed Operations and Lowers Maintenance Costs. Francis A. Westbrook. *Modern Industrial Press,* v. 10, June 1948, p. 28, 32, 34.
Application to punch presses.

19a-129. New Press Dept. Speeds Production of Sterilizers. Walter Rudolph. *Modern Industrial Press,* v. 10, June 1948, p. 36, 38, 40, 50.
Equipment and procedures.

19a-130. Versatile Press Department Is Vital Component in Navy's Lead-

ing Plane Maintenance Base. J. Delamar Harrell. *Modern Industrial Press,* v. 10, June 1948, p. 42, 44, 46.

19a-131. Bending Allowances and Flange Development. N. P. Skinner. *Machinery* (London), v. 72, June 3, 1948, p. 675-678.

Data for any angle of bend without interpolation, and requiring only one addition or subtraction to determine the flange allowance to be added to the profile ordinate.

19a-132. Tool for Bending Lifting Eyes. R. Harris. *Machinery* (London), v. 72, June 3, 1948, p. 679-680.

How lifting eyes, which are used for lifting crates, can be made by means of a hand-operated tool.

19a-133. The Calculations of Forces and Power Requirements for the Rolling of Metals. A. Geleji. *Engineers' Digest* (American Edition), v. 5, May-June, 1948, p. 174-177. Translated and condensed from *Schweizer Archiv,* v. 13, Nov. 1947, p. 336-344.

Previously abstracted from original source. See item 19a-16, 1948.

19a-134. Application of the Basic Principles of Rolling in Roll Design. Ross E. Beynon. *Iron and Steel Engineer,* v. 25, June 1948, p. 37-59; discussion p. 59.

19a-135. Structural and Rail Mill Rolls Uses and Applications. A. F. Eisel. *United Effort,* v. 28, June 1948, p. 6-8.

19a-136. Gas-Turbine Blades; Materials and Forging Practice in Germany. *Iron and Steel,* v. 21, June 1948, p. 309-311. Based on F.I.A.T. Reports No. 1148, 1129, and 291.

Forming and welding of hollow turbine blades. Composition of the alloys used, and design and fabrication of a proposed motor-boat turbine.

19a-137. Metal Stampings Made by Specialists. Albert Kaser. *Western Machinery and Steel World,* v. 39, June 1948, p. 86-89, 112-113.

Equipment and procedures.

19a-138. Auxiliary Pre-Forming Mechanism. *Western Machinery and Steel World,* v. 39, June 1948, p. 116-117.

Reduced scrap loss, increased die life, and higher production rates are being realized by a new forging technique. "Maxirolling", as the process is called, is a rolling operation done in a "Maxipres" which prepares blanks with accurately reduced sections.

19a-139. Get More From Your Press Brake. Part I. Designing for the Press Brake. *Sheet Metal Worker,* v. 39, June 1948. p. 52-53, 60.

19a-140. Progressive Dies; How to Appraise Their Applicability. R. J. Harris. *Steel,* v. 122, June 28, 1948, p. 78-80, 104.

Factors to be considered in analyzing technical and economic feasibility of application to specific jobs.

19a-141. Progressive Die Design. Part VI. C. W. Hinman. *Modern Machine Shop,* v. 21, July 1948, p. 166-168, 170, 172, 177, 178.

A precision die designed for production of transformer-coil laminations. This die will perforate, blank, and stack automatically in chutes at the rate of four blanks per press stroke.

19a-142. Why Dies Fail. C. A. Brenner. *Machinery,* v. 54, July 1948, p. 155-159.

Effects of poor design, bad operating techniques, and improper maintenance on die life. Suggestions for eliminating the common causes of die failure.

19a-143. World's Largest Mechanical Forging Press. *Machinery,* v. 54, July 1948, p. 160.

800-ton press for forging automobile crankshafts.

19a-144. Products Manufactured by Cold Roll-Forming. E. J. Vanderploeg. *Machinery,* v. 54, July 1948, p. 179-182.

Typical structural shapes, moldings and trim, tubes, coiled parts, and wide sections made by process.

19a-145. Preforming in Forging Operations. *Machinery,* v. 54, July 1948, p. 185-186.

Application of an auxiliary preforming mechanism—the "Maxiroll".

19a-146. Die That Forms Eight Right-Angle Bends in One Press Stroke. L. Kasper. *Machinery,* v. 54, July 1948, p. 197-199.

19a-147. Universal Perforating Equipment. *Tool & Die Journal,* v. 14, July 1948, p. 60, 62, 66.

Application of equipment for piercing holes up to 3 in. in diameter in mild steel ¼ in. thick with standard equipment and larger holes with special units.

19a-148. Metallurgy of "Ampco 24" Aids Forming and Drawing of Stainless Steel. John C. Kemp. *Tool & Die Journal,* v. 14, July 1948, p. 68, 70, 116.

"Ampco 24" is a new bronze alloy which possesses unusual wear resistance because of a new intermetallic compound. Ten well-known companies tried out the alloy on the production line, and reported service lives two to five times those of bronze dies.

19a-149. Piercing Attachment. W. E. Allan. *Production Engineering & Man-*

agement, v. 22, July 1948, p. 65.

Movable "outboard-type" die set arrangement, solved the problem of piercing extra long shells of light-gage metal on a standard punch press when the conventional setup could not be used because of the great shut-height required.

19a-150. The Extrusion of Plastic Sheet Through Frictionless Rollers. G. F. Carrier. *Quarterly of Applied Mathematics,* v. 6, July 1948, p. 186-192.

An approximation technique which leads directly to a justification of the one-dimensional theory for the cases where the cylindrical surfaces are frictionless and t/R is less than 1.

19a-151. Some Applications of the Press Brake. W. Earl Peters. *Machinery* (London), v. 72, June 10, 1948, p. 699-705.

Materials that can be formed; tolerances maintained; typical operations.

19a-152. Fundamentals of Forging Practice. Waldemar Naujoks. *Steel,* v. 123, July 5, 1948, p. 76-79, 104; July 19, 1948, p. 99-100, 102, 128.

Part three of series continues review of forging methods, steps used in increasing the diameter or square of a bar, punching holes in flattened stock, forging rings, and other smith and drop-forging techniques. Part four describes steps in upsetting and press forging and outlines practical rules regulating the application of these operations. (To be continued.)

19a-153. Design, Construction and Lubrication of Mill Couplings and Spindles. William L. Stover. *Iron and Steel Engineer,* v. 25, July 1948, p. 62-68; discussion, p. 68.

Includes diagrams and illustrations.

19a-154. Drawing or Forming Dies. Charles R. Cory. *Machinery* (London), v. 72. June 17, 1948, p. 727-732.

Decision as to whether a part can be shaped in a forming die or must be made in a more expensive drawing die—either single or double-acting—followed by a trimming die, depends primarily on the tendency of the part to wrinkle or tear. It also depends on thickness of the metal, depth of the draw, and height of the flange to be formed.

19a-155. Why Hydraulic Presses? Herbert Chase, *Tool & Die Journal,* v. 14, July 1948, p. 46-50, 116.

Advantages of the hydraulic press as compared with crank presses. (To be continued.)

19a-156. Trapped Stresses. Henry O. Fuchs. *Machine Design,* v. 20, July 1948, p. 114-118, 178.

How residual stresses can be intentionally produced by heat treatment, shot-peening, overstressing, and other methods, in order to help carry loads and to increase the strength of parts against static and fatigue failure. Miscellaneous applications such as prestressing of automotive leaf springs; overstressing gun barrels; and shot-peening automotive rear axles. Methods for trapping stresses include mechanical (overloading, burnishing, and shot-peening); thermal (selective quenching and shrink fitting); and metallurgical (carburizing, nitriding, and shallow hardening).

19a-157. Air Circuits for Press Control. W. J. Schupner. *Applied Hydraulics,* v. 1, July 1948, p. 13-15.

Each of the three control circuits described has a particular feature which makes it adaptable to certain press applications, especially in die forming, riveting, and in punch-press work.

19a-158. Dies for Drawing Complex Shapes; Design of Dies for Parts Requiring a Two-Way Punch Action or More Than One Drawing Operation. Charles R. Cory. *Machinery* (London), v. 72, June 24, 1948, p. 755-761.

19a-159. Forging Used to Reduce Scrap. *SAE Journal,* v. 56, July 1948, p. 30-32. Based on **Development of Low Weight Forgings** by J. H. Friedman.

Previously abstracted from *Steel Processing,* v. 34, April 1948, p. 183-190, 192. See item 19a-75, 1948.

19a-160. Experimental Investigation of the Specific Pressure of Metal Flow During Drawing. (In Russian.) S. J. Gubkin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 239-250.

Results for both ferrous and nonferrous metals using a specially developed apparatus. Experimental data agreed closely with results of theoretical calculations, using a newly derived formula.

19a-161. Designing of "Trouble-Free" Dies. Part LXXXIII. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, July 1948, p. 20,32.

19a-162. Work Center System Improves Production Efficiency at Richmond Engineering Company. Gerald E. Stedman *Modern Industrial Press,* v. 10, July 1948, p. 40, 42, 44.

Fabricates steel plate, aluminum, copper alloys, Monel, and stainless steel, working plate up to 1 in. thickness. Both cold and hot-formed heads for a great variety of pressure vessels and tanks are produced in sizes up to 30,000 gal. capacity or over and in diameters up to 12 ft. Equipment, procedures, and layout.

19a-163. Rectifier Production at McColpin-Christie Corp., Ltd. William Edwards. *Modern Industrial Press,* v. 10, July 1948, p. 51-52.

Press operations.

19a-164. Centerless Plunge-Grinding. *Aircraft Production,* v. 10, July 1948, p. 231.

Automatic loading and operation control.

19a-165. Tube-Bending. *Aircraft Production,* v. 10, July 1948, p. 232-234.

High-production, hydraulically-controlled machine.

19a-166. Form Dressing. *Aircraft Production,* v. 10, July 1948, p. 235-237.

Operation of improved diaform attachment for use on horizontal-spindle surface grinders and incorporating a pantograph for guiding a diamond-tipped dressing tool from a templet to produce desired contours.

19a-167. Stamping Data. I. *American Machinist,* v. 92, July 29, 1948, p. 125.

Formula and bend allowance chart (metal thickness vs. degrees of bend.)

19a-168. A Theory of the Yielding and Plastic Flow of Anisotropic Metals. R. Hill. *Proceedings of the Royal Society,* ser. A, v. 193, May 27, 1948, p. 281-297.

A theory for plastic flow. The type of anisotropy considered is that resulting from preferred orientation. A yield criterion is postulated on general grounds which is similar in form to the Huber-Mises criterion for isotropic metals, but which contains six parameters specifying the state of anisotropy. The theory was applied to experiments of Korber & Hoff (1928) on the necking under uniaxial tension of thin strips cut from rolled sheet. It was shown that there are generally two, equally possible, necking directions whose orientation depends on the angle between the strip axis and the rolling direction. Pure torsion of a thin-walled cylinder was also analyzed. With increasing twist, anisotropy is developed. The theory was also applied to determine the earing positions in cups deep-drawn from rolled sheet. 12 ref.

19a-169. Heavy Forging Plants. *Iron and Steel,* v. 21, July 1948, p. 349-350.

Equipment and some procedures utilized at various German plants.

19a-170. Large Hydraulic Forging Presses. M. D. Stone. *Transactions of the American Society of Mechanical Engineers,* v. 70, July 1948, p. 499-514.

Development of the above, culminating in the 14,000-ton forging presses built for the U. S. Navy during the recent war. A detailed account of the design, construction, installation, and operation of two of the latter presses is given as well as comparative performance data and cost studies. Numerous German installations of heavy stamping or die-forging presses with capacities up to 30,000 metric tons. Press-design calculations.

19a-171. Unconventional Tooling. J. S. Needham. *Aircraft Production,* v. 10, Aug. 1948, p. 253-255.

Design and use of certain de Havilland Dove rubber-die press tools which are out of the ordinary for work in this category. Tooling cost, weight and material economy, appearance and production cost of components have all been studied in the production of these tools.

19a-172. Lamination Die Design. Martin George. *Tool & Die Journal,* v. 14, Aug. 1948, p. 40-43, 62, 64, 78-79.

Principles of design of dies for production of laminated sheet metal pieces used by the electrical industry.

19a-173. Short Run Dies of Wood, Glass and Concrete. Walter Rudolph. *Automotive Industries,* v. 99, Aug. 1, 1948, p. 46-47, 88.

Applications and possible savings effected.

19a-174. Wire Mill Practice. Part 3. Consideration of Drawing Die Efficiency. W. F. G. Kerley. *Wire Industry,* v. 15, July 1948, p. 457-458.

Factors relevant to diamond die efficiency. Tests on drawing-die shape. (To be continued.)

19a-175. Why Hydraulic Presses? Part II. Herbert Chase. *Tool & Die Journal,* v. 14, Aug. 1948, p. 44-47.

Advantages over crank presses, giving various examples of their successful application. (To be continued.)

19a-176. Production Standards Raised by Improved Processes. *Production Engineering & Management,* v. 22, Aug. 1948, p. 56-62.

Special-purpose machines that have materially reduced the processing time on many of the heater components. Reduction of stockpiling of sheet, simplification of material feeding, and continuous welding process.

19a-177. Productive Machine Time Increased With Carbide Lamination Dies. Frank M. Scotten. *Production Engineering & Management,* v. 22, Aug. 1948, p. 47-49.

Operating economies, resulting from the use of carbide lamination dies presage an expanding use of carbide for blanking and piercing operations on light-weight sheet steel.

19a-178. Impact Extrusions; Their Design and Production. Herbert Chase. *Machinery,* v. 54, Aug. 1948, p. 147-152.

Advantages, limitations, production methods, and application of impact extrusions. (To be continued.)

19a-179. Fundamentals of Forging Practice. (Continued.) Waldemar Naujoks. *Steel,* v. 123, Aug. 2, 1948, p. 91-94, 96, 98.

Various types of forging equipment, including helve power and general forging hammers, hydraulic presses, board and steam drop hammers, forging machines, and rolls. (To be continued.)

19a-180. Die-Casting Dies. W. M. Halliday. *Metal Industry,* v. 73, July 23, 1948, p. 63-65, 70.

Toolroom fixtures, devices and methods for proving the production ability of new dies.

19a-181. Get More From Your Press Brake. Part II. *Sheet Metal Worker,* v. 39, Aug. 1948, p. 38-39.

Method of setting dies. Suggestions on maintenance and uses.

19a-182. Forging Die Design. Straightening Dies. John Mueller. *Steel Processing,* v. 34, Aug. 1948, p. 409-411, 426.

Some of the processes being employed by forgers to straighten warped and distorted forgings and some of the factors responsible for warp and distortion when forging, trimming and heat treating these parts.

19a-183. Hard Die Inserts Increase Die Life, Cut Down-Time and Decrease Cost Per Unit. Frederick Lovell. *Steel,* v. 123, Aug. 23, 1948, p. 108.

How applications of the principle of using hard die inserts to increase production per die change often result in considerable savings in die and installation costs.

19a-184. Cracks in Presses Repaired Quickly. J. W. Hillhouse. *American Machinist,* v. 92, Aug. 26, 1948, p. 73-76.

Various applications of "metalock."

19a-185. True Stress-Strain Curves and Their Application to Cold-Working Processes. E. Voce. *Metal Treatment and Drop Forging,* v. 15, Summer 1948, p. 53-66, 72.

Relation between strain and true stress—the stress at any stage during deformation, expressed in terms of the actual area of the specimen at that stage. Some simple principles are worked out and applied to wire drawing, rolling, deep drawing and cupping tests.

19a-186. The Relationship Between Stress and Strain for Homogeneous Deformation. E. Voce. *Journal of the Institute of Metals,* v. 74, July 1948, p. 537-562.

A simple relationship connecting stress with strain for a series of homogeneous compression curves published by Cook and Larke. The plastic modulus at any instant is proportional to the available stress capacity. The same relationship appears to hold for tension as well as for compression as long as the deformation remains homogeneous. The concepts are admitted to be speculative in character and to be based on limited experimental evidence.

19a-187. Note on a New Method for Checking the Profile of Wire-Drawing Dies. J. G. Wistreich. *Engineers' Digest,* v. 5, July 1948, p. 263.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 158, Part 4, April 1948, p. 496. See item 19a-97, 1948.

19a-188. Designing of "Trouble-Free" Dies. Part 84. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, Aug. 1948, p. 20, 42.

19a-189. The Art of Rolling Hexagons and Octagons. Charles P. Hammond. *Iron and Steel Engineer,* v. 25, Aug. 1948, p. 37-49; discussion, p. 49-50.

Although modern mills and equipment produce tonnages and quality which previously would have seemed impossible, rolling procedures and principles are fundamental.

19a-190. Drives For Automatic Speed and Tension Control In Wire Processing Equipment. Part II. N. J. Ranney. *Wire and Wire Products,* v. 23, Sept. 1948, p. 763-768, 802-803.

Details of mechanical and hydraulic drives and their applications.

19a-191. Die Design for Symmetrical Brackets. Part I. Hans Effgen. *Tool & Die Journal,* v. 14, Sept. 1948, p. 51-56.

Calculations and blueprint-type diagrams.

19a-192. Why Hydraulic Presses? Part III. Herbert Chase. *Tool & Die Journal,* v. 14, Sept. 1948, p. 57-59.

Advantages over other types.

19a-193. Metal Stampings For Ordnance Held to be Answer to Many Needs of Armed Forces. *Steel,* v. 123, Sept. 6, 1948, p. 120, 140. Based on address by Howard C. Wolf.

Recommends more consideration of stampings to save raw material and reduce production costs. Processes of cold forming, deep drawing, and cold extrusion; also new fields for alloy steel.

19a-194. The Effect of Crystal Arrangement on "Secondary Recrystallization" in Metals. J. S. Bowles. *Journal of the Institute of Metals,* v. 74, June 1948, p. 501-519.

The effects on secondary recrystallization of the amount of deformation and of the mode of arrangement of the crystals were separated by studying this phenomenon in specimens which had been given the same amount of deformation by straight rolling and compression rolling. Straight-rolled specimens possessed the usual type of preferred orientation, while the compression-rolled specimens possessed fibrous structures. The work was done using copper, silver, and two grades of aluminum. 23 ref.

19a-195. A New Theory of the Plastic Deformation in Wire-Drawing. R. Hill and S. J. Tupper. *Journal of the Iron and Steel Institute,* v. 159, Aug. 1948, p. 353-359.

New theory proposed differs from previous work in that the stresses and the plastic region are determined by considerations of the associated deformation. The theory is based on a two-dimensional model which gives results close to actual experience. 11 ref.

19a-196. Fundamentals of Forging Practice. VII and VIII. Waldemar Naujoks. *Steel,* v. 123, Aug. 30, 1948, p. 59-64, 86; Sept. 13, 1948, p. 100-103, 126.

Of the many factors important to the practical application of forging techniques, none is more essential than the correct construction of die blocks and tools. Selecting steels, laying out, sinking the impression, pouring the lead proof, shrink rules, finish machining. Facilities for performing various nonforging services such as cutting bars and billets, trimming and punching, coining and sizing, which must be available in any efficient forging plant.

19a-197. Production Processes—Their Influence on Design. Part XXXVII. Cold Drawing. Roger W. Bolz. *Machine Design,* v. 20, Sept. 1948, p. 129-134.

Procedures and design principles.

19a-198. A Law of Work-Hardening. A. M. Fruedenthal and M. Reiner. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 265-273.

Based on the "blocking" theory of the strength of a polycrystalline metal, a law of work-hardening was derived and checked experimentally on mild steel deformed by wire drawing. The law correlates the recoverable strain work with the total work of deformation in a series of exponential functions, the number of which corresponds to the number of sizes of crystal grains present in the annealed state. 13 ref.

19a-199. Contact Stresses in the Rolling of Metals. I. C. W. MacGregor and R. B. Palme. *Journal of Applied Mechanics,* v. 15. (*Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 297-302.

Special equipment was designed and constructed to investigate the distributions of the normal pressures and the longitudinal and transverse shearing stresses along the arc of contact during the rolling of metals between plain cylindrical rolls. 14 ref.

19a-200. Specializing in the Impossible. Rudolf Regen. *Western Machinery and Steel World,* v. 39, Sept. 1948, p. 82-85, 110-111.

Equipment and procedures of die-making and press-forming shop.

19a-201. Versatility in Drop Hammer Work. *Sheet Metal Worker,* v. 39, Sept. 1948, p. 45-46.

Production of miscellaneous sheet metal parts on the drop hammer.

19a-202. Get More from Your Press Brake. Part III. Standard Die Sets Altered for Heating and Air Conditioning Work—A Die for Economical Gutter Production. *Sheet Metal Worker,* v. 39, Sept. 1948, p. 48, 50, 114.

19a-203. Wire Mill Practice. No. 4. The Diamond Wire Drawing Die. W. F. G. Kerley. *Wire Industry,* v. 15, Sept. 1948, p. 589-590.

19a-204. The Speed of Electric Drives for Coilers on Cold Rolling Mills. A. N. Iroshnikov. *Engineers' Digest.* (American Edition), v. 5, Aug. 1948, p. 315. Translated and abstracted from *Vestnik Electropromyshlennost.* (Bulletin of the Electrical Industry.) No. 8, 1947, p. 8-9.

Equations for use in calculating.

19a-205. Lubricants in Deep Drawing and the Removal of Residues. P. D. Liddiard. *Enamelist,* v. 25, Sept. 1948, p. 28-35, 38-42.

The lubrication of two surfaces moving at low speeds in relation to each other and under heavy loads; and the removal of lubricant residues and decomposition products after the drawing operation. Fundamentals of boundary lubrication and the choice of lubricants and materials for deep drawing; also cleaning methods.

19a-206. "Modern Presses", Their Selection & Application. *Modern Industrial Press,* v. 10, Sept. 1948, p. 6, 8, 36, 56, 58.

19a-207. Metal Stamping Operations Coin Money For San Francisco Mint. J. Delamar Harrell. *Modern Industrial Press,* v. 10, Sept. 1948, p. 13-14, 18, 22.

One of the world's few establishments in the metal rolling and stamping field which is theoretically capable of paying for itself with a few days' operation.

19a-208. Designing of "Trouble-Free" Dies. Part LXXXV. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, Sept. 1948, p. 20, 22.

Straight-side high-speed presses, high-speed inclinable presses, and super-speed presses.

19a-209. Bush Manufacturing Co.'s "Compact Press Department" Gains Unusual Production. Gerald E. Stedman. *Modern Industrial Press,* v. 10, Sept. 1948, p. 46, 48, 60, 62.

Equipment and procedures in press department of above manufacturer of condensers, evaporators, unit coolers, steam and water coils, and heat-exchange equipment.

19a-210. Rolled Bars; Calculation of Spread Between Non-Parallel Roll Surfaces. A. E. Lendl. *Iron and Steel,* v. 21, Sept. 1948, p. 397-402.

Calculations for two typical cases.

19a-211. Flame Spinning; Simultaneous Heating and Roll-Forming of Tubular Work. *Aircraft Production,* v. 10, Sept. 1948, p. 315.

New British process performed on an ordinary lathe (with a simple roll-type forming attachment) in conjunction with standard oxy-acetylene equipment.

19a-212. Guillotine Shear for Sheet. *Iron Age,* v. 162, Sept. 23, 1948, p. 101.

New principle in sheet shearing incorporated in new Talbot type shear for aluminum, steel, brass, copper, or other metallic sheet and strip material. It differs from other guillotine flying shears principally in knife-path motion.

19a-213. Rigidizing: Magic Touch to Sheet Metal. *Steel Horizons,* v. 10, no. 4, [1948], p. 3-4, 26.

New process for improving the physical properties of flat rolled metals and its applications.

19a-214. Cost Cutting With Rotary Swaging. A. E. Rylander. *Tool Engineer,* v. 21, Oct. 1948, p. 17-20.

Methods, equipment and applications. In rotary swaging, the dies revolve around the work and derive striking power from radially located rollers. Displacement of metal, rather than its removal, saves both time and material. Other advantages.

19a-215. What Type of Press Should You Buy? H. L. Reynolds. *Applied Hydraulics,* v. 1, Oct. 1948, p. 12-14, 18, 24.

Classifications of metal working most advantageously done on hydraulic and mechanical presses; advantages and disadvantages of hydraulic and mechanical single and double-action presses.

19a-216. Practical Development of Modern Wire Drawing Compounds. E. L. H. Bastian. *Wire and Wire Products,* v. 23, Oct. 1948, p. 890-894, 962-963.

Selection of the proper wire-drawing compound for a given job.

19a-217. Practical Application and Mill Practice with Carbide Dies. E. T. Miller. *Wire and Wire Products,* v. 23, Oct. 1948, p. 910-913.

Contrasts previous die practices with modern methods of wire drawing using carbide dies.

19a-218. A Method for Measuring the Effect of Die Shape and the Use of Various Lubricants in Non-Ferrous Wire Drawing. Carl B Shopmyer. *Wire and Wire Products,* v. 23, Oct. 1948, p. 916-917.

A new method and apparatus for measuring the effect of die shape and lubricants in nonferrous wire drawing and the results obtained with it. The apparatus itself is not described to any extent.

19a-219. High-Production Rolling of Precision Threads. *Machinery,* v. 55, Oct. 1948, p. 152-156.

How threading, burnishing, knurling, or serrating of solid bars and hollow tubes up to 1½ in. in diam. can be performed in a new hydraulic thread-rolling machine at rates of 500 to 1000 pieces per hr.

19a-220. Manufacturing Versatility in Press Brakes. Cyril J. Bath. *Sheet Metal Worker,* v. 39, Oct. 1948, p. 40-41.

Some types made by Cyril J. Bath Co., Cleveland.

19a-221. Many Production Problems Solved with Versatile Notcher and Shearing Tool. *Sheet Metal Worker,*

v. 39, Oct. 1948, p. 44-45, 48.

19a-222. The Sendzimir Cold Strip Mill. A. I. Nussbaum. *British Steelmaker,* v. 14, Oct. 1948, p. 458-462.

Described, diagrammed, and compared with conventional mills.

19a-223. German Practices in Drawing and Forging Turbine Blades. R. T. Willson. *Steel Processing,* v. 34, Oct. 1948, p. 545-548. Based on F.I.A.T. Reports No. 1129 and 1148.

19a-224. An Italian Process for the Production of Rod and Wire. *Wire Industry,* v. 15, Oct. 1948, p. 657.

Process and equipment for production of Pb, Al, Zn, or other wire directly from molten metal.

19a-225. Modern Cold Drawn Equipment. G. W. Garwig and A. L. Thurman. *Iron and Steel Engineer,* v. 5, Oct. 1948, p. 90-99; discussion, p. 99-100.

Various types of cold drawing equipment, including auxiliary and control apparatus.

19a-226. Plastic Bending Under Tension. H. W. Swift. *Engineering,* v. 166, Oct. 1, 1948, p. 333-335; Oct. 8, 1948, p. 357-359.

Thesis that plastic bending under super-imposed tensile stress inevitably produces thinning of the material, and that it is this thinning which is mainly responsible for the discrepancy between theory and practice in deep drawing. Second installment describes apparatus designed to bend strip metal up to 2 in. wide and up to 0.08 in. thick under controlled tension. Results obtained with aluminum, brass, and mild steel.

19a-227. Stamping Data. IV and V. *American Machinist,* v. 92, Oct. 21, 1948, p. 143, 145.

Presentation of diagrams showing practices followed by automobile manufacturers and agricultural implement makers and incorporated in their handbooks of engineering standards.

19a-228. West Coast Plant to Augment Supply of Electrolytic and Hot-Dip Cold Reduced Tin Plate. *Steel,* v. 123, Nov. 1, 1948, p. 100, 103-104, 106, 109-110.

New plant of Columbia Steel at Pittsburg, Calif.

19a-229. Gravity Pressure for Drawing Dies. Frederico Strasser. *Tool Engineer,* v. 21, Nov. 1948, p. 34-35.

A method for attaining diminishing pressure as the draw proceeds.

19a-230. Designing of "Trouble-Free" Dies. Part LXXXVI. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, Oct. 1948, p. 22, 24.

Dieing machines and high-speed blankers.

19a-231. Press Department Builds National Motor Bearing Company. J. Delamar Harrell. *Modern Industrial Press,* v. 10, Oct. 1948, p. 26, 28, 30.

Manufacture of oil-retention devices using a wide variety of types of mechanical presses.

19a-232. Novelty Clock Making at Cliff Stone Mfg. Co. Howard E. Jackson. *Modern Industrial Press,* v. 10, Oct. 1948, p. 32, 36, 38.

Use of shears and punch presses.

19a-233. How to Determine the Center of Cut in Dies. Federico Strasser. *Modern Industrial Press,* v. 10, Oct. 1948, p. 50, 52.

19a-234. Some Fundamental Considerations of the Deep Drawing of Metals. A. R. E. Singer. *Steel Processing,* v. 34, Oct. 1948, p. 530-533.

Logical planning of metallurgical research. Necessity of creating a working "model", mental or otherwise, of the process being investigated. The mechanism of deep drawing is analyzed for a simple case. The relationship of plastic deformation and mechanical properties of the metal. (To be continued.)

19a-235. Die Design for Symmetrical Brackets. Part II. Hans Effgen. *Tool & Die Journal,* v. 14, Nov. 1948, p. 58-60, 62.

Construction of two-station progressive dies for a third type of bracket and also a continuation of a general discussion of design theory as related to the case at hand.

19a-236. Volume and Flexibility Feature Chevrolet's Axle Housing Job. P. D. Aird. *Modern Industrial Press,* v. 10, Nov. 1948, p. 13-14, 16, 20.

Press and other operations.

19a-237. Designing of "Trouble-Free" Dies. Part LXXXVII. High-Speed Presses. C. W. Hinman. *Modern Industrial Press,* v. 10, Nov. 1948, p. 18, 20.

Multi-slide machines and hypermatic high-speed presses.

19a-238. Unusual Press Production Proves Its Worth at Kenworth Motor Truck Corporation. Howard E. Jackson. *Modern Industrial Press,* v. 10, Nov. 1948, p. 22, 24, 26, 46.

Press operations, forming-die production, and welding operations.

19a-239. Presses Important in the Development of Novel, Small Metal and Plastic Products. Walter Rudolph. *Modern Industrial Press,* v. 10, Nov. 1948, p. 32, 36, 38.

19a-240. Presses Speed Production of Electric Power Drives. Fred. M. Burt. *Modern Industrial Press,* v. 10, Nov. 1948, p. 40, 42, 44.

Layout, equipment, and procedures. Welding and die-casting operations.

19a-241. Another Easy Job for Your Blowpipe. I. Kurzinski. *Welding Journal,* v. 27, Nov. 1948, p. 955-956.

Use for bending, straightening, and forming.

19a-242. Punch Jig With Full Positioning Control. *Sheet Metal Worker,* v. 39, Nov. 1948, p. 37.

Equipment for processing cold-rolled steel and other metals.

19a-243. Press Brake for Gang Punching. *Sheet Metal Worker,* v. 39, Nov. 1948, p. 47.

Equipment and applications.

19a-244. One-Stage Super-Depth Drawing. Bill Edwards. *Western Metals,* v. 6, Nov. 1948, p. 32.

Drawing of aluminum, steel, and brass to depths up to 9 in. in one-stage die operations without excessive work hardening or defects. These draws are said to be made possible by use of a new type petroleum-base lubricant, composition of which is a secret.

19a-245. Small Ferrule and Clip Forming Tool. J. C. Murgatroyd. *Machinery* (London), v. 73, Nov. 4, 1948, p. 642.

19a-246. Die Setting and Economical Punch Press Operation. E. H. Girardot. *Iron Age,* v. 162, Nov. 18, 1948, p. 94-98.

Some "Do's" and "Don'ts" for the die setter and a program for training die setters.

19a-247. Roll Neck Seals; Their Development and Application. F. E. Payne. *Steel,* v. 123, Nov. 29, 1948, p. 92, 94, 98, 102.

Sealing in the vertical plane with an end-face positive seal which results in increased roll life, longer bearing life, no loss of lubricant, elimination of strip straining, and cleaner and safer mills.

19a-248. Some Fundamental Considerations of the Deep Drawing of Metals. Part II. (Concluded.) A. R. E. Singer. *Steel Processing,* v. 34, Nov. 1948, p. 595-597.

Different types of frictional conditions existing between metal surfaces and their fundamental relationship to deep drawing. The problem of lubricant development for deep drawing, the fundamental properties peculiar to particular metals, and application of the results of fundamental research to production problems.

19a-249. A Method of Ensuring Clearance for Slug Disposal in Press Operations. P. E. Crome. *Machinery* (London), Nov. 11, 1948, p. 672.

19a-250. Movable Units Punch Four Internal Flanges. *Product Engineering,* v. 19, Dec. 1948, p. 100.

Unit for punching holes in refrigerator-door stampings.

19a-251. Punch and Die Construction Practices; Standardization in Die Construction. Federico Strasser. *Tool & Die Journal,* v. 14, Dec. 1948, p. 59-60, 62-64.

19a-252. Improved Forming Technique at Northrop. T. E. Piper and Al Schoellerman. *Automotive Industries,* v. 99, Dec. 1, 1948, p. 40-43, 78.

How practical reduction in bend radii is achieved by a new punch design, which has a flat spot on its nose.

19a-253. Contribution a l'etude des laminoirs a bandes. (Contribution to the Study of Continuous Strip Rolling Mills.) Paul Blain. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 241-248.

A comprehensive study of existing types of rolling mills, with emphasis on the continuous strip type.

19a-254. A New Theory of the Plastic Deformation in Wire-Drawing. Part I. R. Hill and S. J. Tupper. *Wire Industry,* v. 15, Nov. 1948, p. 739-741.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, Aug. 1948, p. 353-359. (To be continued.) See item 19a-195, 1948.

19a-255. Die for Forming Eight Right-Angle Bends in One Press Stroke. *Machinery* (London), v. 73, Nov. 18, 1948, p. 707-708.

19a-256. Dies for Drawing Operations. VII. J. W. Lengbridge. *Tool Engineer,* v. 21, Dec. 1948, p. 34-37.

Various types of equipment used for metal drawing.

19a-257. Shaping and Forming. Willibald Trinks. *Yearbook of the American Iron and Steel Institute,* 1947, p. 416-443; discussion, p. 444-445.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 19-245, 1947.

19a-258. Röntgenographische und mechanische Untersuchung des Fliessvorganges bei Biegung. (Radiographic and Mechanical Investigation of Flow in Bending.) Rudolf Böklen and Richard Glocker. *Metallforschung,* v. 2, Oct. 1947, p. 304-309.

The X-ray method and a mechani-

cal testing device were used to measure the effect of the bending moment on the extension of the surface layers of rectangular test bars, also the depth dispersion of the bending stress. It was found that the metal begins to flow at the surface when the stress has reached about the magnitude of the yield point, and that it extends toward the interior as the applied moment is increased. 12 ref.

19b—Ferrous

19b-1. Torrington Four-Row Roll Neck Bearings. Part III. Maintenance. *Bearing Engineer,* v. 7, Nov-Dec. 1947, p. 5.

Selection, application, and maintenance of four-row tapered roller bearings for steel mill service. (Concluded.)

19b-2. Rules for Upsetting Bar Stock. *American Machinist,* v. 92, Jan. 1, 1948, p. 123.

Rules, formulas, and diagrams.

19b-3. Rules for Upsetting Tubing. *American Machinist,* v. 92, Jan. 1, 1948, p. 125.

Rules, formulas, and diagrams.

19b-4. New Canadian Continuous Strip Mill. F. J. Erroll. *British Steelmaker,* v. 13, Dec. 1947, p. 612-613.

Operation of the 56-in. continuous hot-strip mill.

19b-5. The Stainless Steels—Fabrication and Heat Treatment After Cold Working. Part III-A. Lester F. Spencer. *Steel Processing,* v. 33, Dec. 1947, p. 755-760.

Spinning and annealing pretreatments; cold heading; the pickling of austenitic compositions, including pickling solutions and equipment used in pickling. (To be continued.)

19b-6. Pressures to Pierce Sheet Steel. E. V. Sargeant. *American Machinist,* v. 92, Jan. 1, 1948, p. 139, 141.

Two charts of piercing pressure vs. hole size for various thicknesses.

19b-7. Press Forging. *Automobile Engineer,* v. 37, Dec. 1947, p. 493-497.

Advantages to be gained through use of press forging; some actual automobile applications.

19b-8. Die Material Changeover Increases Bearing Output Tenfold. *Steel,* v. 122, Jan. 12, 1948, p. 98.

Results of installation of carbide cut-out and cupping dies in a nine-stage progressive die set.

19b-9. Test Cases Prove Shot-Peening Merit. *SAE Journal,* v. 56, Jan. 1948, p. 65. Based on "Shot-Peening", by Fred K. Landecker.

Charts show value as determined on various tractor and truck parts. (To be printed in full in *SAE Quarterly Transactions.* Presented at S.A.E. National West Coast Transportation & Maintenance Meeting, Los Angeles, Aug. 21, 1947.)

19b-10. Drawing Auto Engine Rocker-Arm Covers. T. E. Lloyd. *Iron Age,* v. 161, Jan. 15, 1948, p. 84-86.

Mainly because of inconsistent thicknesses in purchased sheet steel, Buick has shifted from mechanical to hydraulic presses in deep drawing of rocker-arm covers for its engine. Scrap losses and reworking have been reduced to such an extent that it is now planned to produce oil pans in the same manner.

19b-11. Induction Heating for Forging Operations. J. M. Butler. *Machinery,* v. 54, Jan. 1948, p. 156-157.

Use in forge division, Willys Overland Motors.

19b-12. Drawing Thin-Walled Shells of Intricate Shape. Donald A. Baker. *Machinery,* v. 54, Jan. 1948, p. 171-175.

Series of steps required for production of a thin-walled radio tube part that presents three types of drawing problems—drawing the inside boss, drawing the main shell, and expanding the boss. Final machining.

19b-13. Bending a Textile Mill Forging in an Arbor Press. Robert Mawson. *Machinery,* v. 54, Jan. 1948, p. 190-191.

19b-14. Pilger Mills; a General Review of the German Steel Tube Industry. J. C. Eck and A. E. V. Sparrow. *Iron and Steel,* v. 20, Dec. 1947, p. 669-672.

Based on B.I.O.S. Report No. 3187. (To be concluded.)

19b-15. Modern Small Rolling Mills. G. A. Phipps. *Blast Furnace and Steel Plant,* v. 35, Dec. 1947, p. 1498-1501, 1510, 1512-1513.

Five small high-production mills of American design built and installed in Great Britain during 1932-1939. Two were for the production of rods, one for strip, one for bar and strip, and the other for sections, bar, and strip. (Presented before British Iron and Steel Institute. To be continued.)

19b-16. Crucible Modernizes Wire Mill. John Anthony. *Iron Age,* v. 161, Jan. 29, 1948, p. 70-73.

New straightline pickling unit, new annealing furnaces, continuous coil-grinding equipment and a number of high-speed draw benches at Sanderson-Halcomb works.

19b-17. Drawing Special Types of Industrial Wire. *Steel,* v. 122, Feb. 2, 1948, p. 98-100, 114.

Methods and equipment used by Keystone Steel & Wire Co. in drawing steel wire for miscellaneous industrial purposes.

19b-18. "Ragging" 40-in. Blooming Mill Rolls. *Steel,* v. 122, Feb. 2, 1948, p. 108.

Grooving or "Ragging" 40-in. blooming-mill rolls on a new roll-rotating machine.

19b-19. A Thoroughly Modern Pressroom Makes the Thoroughly Modern Jeep. P. D. Aird. *Modern Industrial Press,* v. 10, Jan. 1948, p. 13-14, 18-19, 40.

Pressing, stamping, shearing, bending, and welding operations.

19b-20. School Bus Body Manufacturer Modernizes Plant With Presses and New Bath Contour Former. Floyd McKnight. *Modern Industrial Press,* v. 10, Jan. 1948, p. 24-26.

Procedures and equipment at Oneida Products Corp., Canastota, N. Y. The frame parts are shaped on a "Universal" contour former, product of Cyril Bath Co., Cleveland.

19b-21. Unusual Presswork Involved at Modern Fabricating Plant of Eaton Metal Products. Gerald E. Stedman. *Modern Industrial Press,* v. 10, Jan. 1948, p. 36, 38, 40.

Procedures and equipment for production of truck, stock, oil, pressure, butane and propane, water-softener, and special-purpose tanks in a wide range of diameters up to 30 ft.

19b-22. Pilger Mills; A General Review of the German Steel Tube Industry. (Concluded.) J. C. Eck and A. E. V. Sparrow. *Iron and Steel,* v. 21, Jan. 1948, p. 33-35. Based on B.I.O.S. Report 3187.

19b-23. Electric Motors Over 300 Hp. Applied to Main Roll Drives in the Iron and Steel and Allied Industries During 1947. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. 69-71.

A tabulation.

19b-24. Punching Narrow Slots in Heavy Plate. *Machinery,* v. 54, Feb. 1948, p. 180.

Recommended procedure for punching rectangular slots in annealed mild-steel plates ⅝ in. thick. The slots are ½ in. wide by 2 in. long, and are staggered with about ⅜ in. of metal between them vertically and ¾ in. horizontally.

19b-25. Deep Drawing Washer Tubs With Less Than 1% Loss. *Ceramic Industry,* v. 52, Feb. 1948, p. 47-48.

Use of deep drawing in fabrication of washing-machine tubs.

19b-26. The Metallurgy of Cold Reduced Sheets. C. L. Altenburger. *Yearbook of the American Iron and Steel Institute,* 1947, p. 459-492; discussion, p. 492-495.

The more important phases of the control and production of cold reduced rolled sheets with emphasis on information which has not previously appeared in the literature. Mechanisms of rimming and capping in ingots; symptoms of segregation; causes of strain aging; effects of additions of nitrogen; aluminum deoxidation; and use of vanadium, silicon, and zirconium, and free energy values of different metal nitrides. Drawability of cold reduced sheets. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.)

19b-27. Stress Concentration and Fatigue Failures. O. Föppl. *Engineer,* v. 185, Jan. 30, 1948, p. 114-115.

Areas of disagreement with S. Timoshenko regarding experimental data and fundamental concepts of the process for raising the endurance limit of highly stressed parts by surface compression.

19b-28. Torsion-Bar Springs. *Engineer,* v. 185, Jan. 30, 1948, p. 115. Translated and condensed from paper by O. Föppl. *Automobiltechnische Zeitschrift,* no. 4, 1947.

Use of "roller-peening" process to increase resistance to fracture of suspension springs used in German tanks. The principle of roller-peening is the same as that of shot-peening. Föppl preferred the former.

19b-29. Fontana Increases Rolling Mill Facilities. J. M. Hooper. *Blast Furnace and Steel Plant,* v. 36, Feb. 1948, p. 197-204.

Progress report on what is being done at the Kaiser Co.'s Fontana plant to speed the production of steel, and to diversify the mill's output to meet the requirements of the Western market. Layout of the mills and roll shapes for the different steps in rolling of various shapes.

19b-30. J. & L. Rolls Tinplate at 70 Miles per Hour. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 99-102.

19b-31. Chevrolet-Indianapolis Door-Line Sets a Fast Pace for Production. P. D. Aird. *Modern Industrial Press,* v. 10, Feb. 1948, p. 13-14, 18, 42.

Including miscellaneous press operations, welding, and assembly.

19b-32. Efficient Production of Screen and Storm Sash in New Corry-Jamestown Plant. Walter Rudolph. *Modern Industrial Press,* v. 10, Feb. 1948, p. 22, 24, 26, 30, 47.

Miscellaneous fabrication operations for steel sash.

19b-33. The Fabrication of Sheet Metal Bathtubs at Norris Stamping and Manufacturing Co. Gerald E. Stedman. *Modern Industrial Press,* v. 10, Feb. 1948, p. 38, 40, 42.

19b-34. Cold Heading Cuts Manufacturing Costs. Chester S. Ricker. *American Machinist,* v. 92, Feb. 26, 1948, p. 89-91.

How replacing screw-machine or milling operations by cold heading can effect over 50% material and labor saving. Stages in bolt manufacture and typical parts produced by cold heading.

19b-35. Skilled Diemaking Permits Intricate Drawing of Integrator Housing. Dan Reebel. *Steel,* v. 122, March 1, 1948, p. 96-98.

Forming of complex-shaped housing for a mechanism used in the Bailey fluid meter, from 16-gage deep drawing sheet steel.

19b-36. Fabricacao de Tubos de Aco. (Manufacture of Steel Tubes.) Henri Meyers. *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 643-662; discussion, p. 663-666.

A brief review of methods of manufacturing seamless-steel tubing is followed by a more detailed description of two continuous processes for the manufacture of welded tubes—the Fretz-Moon system and the electric resistance welding process, as applied in Brazil. Due to economic conditions, the electric welding method is considered more suitable at present.

19b-37. Description of Plant: Merchant-Bar and Wire-Rod Mill at the Dalzell Steel Works, Motherwell. *Journal of the Iron and Steel Institute,* v. 158, Feb. 1948, p. 254-256.

(Presented at 5th meeting of Iron and Steel Engineers Group, Iron and Steel Institute, London, Nov. 26, 1947.)

19b-38. Giant Presses Increase Automotive Frame Output. Walter Rudolph. *Modern Industrial Press,* v. 10, March 1948, p. 26, 28, 30, 34, 36.

Equipment and procedures at Midland Steel Products Co., Detroit and Cleveland.

19b-39. Hobbing Steel Cavities. William Edwards. *Western Metals,* v. 6, Feb. 1948, p. 29-30.

Process and its advantages and limitations.

19b-40. Modern Electric Equipment for Cold Strip Reduction Mills. W. E. Miller. *General Electric Review,* v. 51, March 1948, p. 22-29.

The requirements of motors and controls for modern high-speed tandem mills.

19b-41. Jones & Laughlin Improves Facilities for the Manufacture of Tin Plate. *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 317-321.

19b-42. Modern Small Rolling Mills. Part II. (Continued.) G. A. Phipps. *Blast Furnace and Steel Plant,* v. 36, March 1948, p. 337-342.

Continues description of various British mills. Several layout diagrams. (Presented at meeting of Iron and Steel Institute of Great Britain.)

19b-43. Determining the Origin of Surface Defects in Rolled Steel Products. V. E. Elliott and C. L. Meyette. *Railway Age,* v. 124, March 6, 1948, p. 54-56.

The various types of defects that appear in finished products, some of which appeared in the ingot and others which were formed during rolling. (Condensed from paper pre-

19b-44. Hot Pressing 575-Pound Propeller Hubs. Frank Welshner and A. A. Flout. *Steel,* v. 122, March 15, 1948, p. 90-92, 121.

Use of specially designed multiple-acting hydraulic equipment realizes great savings in forging, heat treating, and machining time on S.A.E. 4340 steel parts at Canton Drop Forging & Mfg. Co.

19b-45. New British Mill Rolls Light Special Sections. *Steel,* v. 122, March 15, 1948, p. 112, 115.

Two-stand roughing, 3-stand intermediate, and 2-stand finishing mill with average production of 75 tons per turn.

19b-46. The Y-Mill. A New Type of Cold Strip Mill. A. B. Montgomery and W. M. McConnell. *Iron and Steel Engineer,* v. 25, March 1948, p. 99-104; discussion, p. 104.

Unique, reversing cold mill which offers possibilities for economy of operation and quality of product rolled. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 22, 1947.)

19b-47. Die for Square-Cornered Airtight Containers. *Machinery* (London), v. 72, March 4, 1948, p. 308-309.

19b-48. Determining Origin of Surface Defects in Rolled Steel Products. V. E. Elliott and C. L. Meyette. *Steel,* v. 122, March 29, 1948, p. 92, 95-96.

Previously abstracted from *Railway Age,* v. 124, March 6, 1948, p. 54-56. See item 19b-43, 1948.

19b-49. Extrusion Forging Ready for Mass Production. *Automotive Industries,* v. 98, April 1, 1948, p. 40, 60.

Initial application at Ford's Canton, Ohio, foundry will be to steel spindles, with other parts to follow. Pilot operation discloses engineering and manufacturing economies.

19b-50. Shot-Peening Castings. C. R. Austin. *Steel,* v. 122, April 5, 1948, p. 79-82, 84.

Results of a study of the effect of shot-peening on "GA Meehanite" (a special cast iron). It was found that endurance limit under load and reversed-bending stresses during rotation was not improved. However a large increase in fatigue life at stresses greater than the endurance limit was obtained.

19b-51. Shot-Peening to Increase Wear Resistance. *World Oil,* v. 127, April 1948, p. 192.
Process and its applications. Effects on different steels.

19b-52. Weirton Steel Rolls Tin-Plate on High Speed Mill. M. J. Wohlgemuth. *Blast Furnace and Steel Plant,* v. 36, April 1948, p. 431-433.

19b-53. Largest Mechanical Press Stamps 32-Ft. Rails. Jack K. Ferguson. *Steel Processing,* v. 34, April 1948, p. 191-192.
Production of automotive-frame rails.

19b-54. Tube Production Increased by New Mill. *Production Engineering & Management,* v. 21, April 1948, p. 57.
New mill for continuous electric welding of steel tubing.

19b-55. Spin 6-in. Thick Steel Plate. *American Machinist,* v. 92, April 8, 1948, p. 83-84.
Forming of elliptically dished tank heads by spinning steel plate in thicknesses up to 6 in. and diameters as large as 18 ft.

19b-56. Fundamentals of Cold Heading. H. E. Linsley. *American Machinist,* v. 92, April 8, 1948, p. 99-110.
Comprehensive report. Cold-heading equipment; punch and die design; and selection of alloys for the punches and dies, as well as for fabrication by the process.

19b-57. Roll Life Increased 35% by Controlled Airless Blasting. *Steel,* v. 122, April 12, 1948, p. 116.
Roll-roughing machine. Abrasive blasting is used to dress as many as five rolls per hr.

19b-58. Back-Pull Wire Drawing. A Critical Review of Literature—Part II. J. G. Wistreich. *Wire Industry,* v. 15, April 1948, p. 253-255.
Previously abstracted from *Journal of the Iron and Steel Institute,* v. 157, Nov. 1947, p. 417-428. See item 19a-1, 1948.

19b-59. Reed Roller Bit Co. Streamlines Forging Department. Gerald E. Stedman. *Modern Industrial Press,* v. 10, April 1948, p. 28, 30, 34.

19b-60. Sheet and Tin-Plate Mills; Measurement of Roll Camber. J. H. Mort. *Iron and Steel,* v. 21, April 1948, p. 111-115.
Methods used during roll dressing. (To be concluded.)

19b-61. Bending a Forging in an Arbor Press. *Machinery* (London), v. 72, April 8, 1948, p. 454.
Method diagrammed.

19b-62. Plastic Deformation of Carbon Steels. Richard Saxton. *Metallurgia,* v. 37, April 1948, p. 293-294.
The more important factors involved in the cold working of carbon steels in wire or bar form.

19b-63. Forging Die Design; Locked Dies. John Mueller. *Steel Processing,* v. 34, May 1948, p. 242-244.
Typical designs.

19b-64. Statistical Analysis for Quality Control of Forgings. Part II. E. W. Mace. *Steel Processing,* v. 34, May 1948, p. 248-250, 258.
Application to a steel thrust washer, about 3 in. diameter and 5/16 in. thick, made on a horizontal forging machine.

19b-65. Modern Trends in Hot Forging Operations. C. W. Hinman. *Steel Processing,* v. 34, May 1948, p. 256-258.
Presses built by National Machinery Co., and typical parts produced on such machines.

19b-66. Mass Production Techniques on Short Run Operations. F. W. Rueblinger. *Production Engineering & Management,* v. 21, May 1948, p. 53-55.
Use of Wiedemann turret punch presses for fabrication of electrical control-equipment panels and cabinets.

19b-67. Oldsmobile Organizes Bumper Bracket Setup. *Automotive Industries,* v. 98, May 15, 1948, p. 29.
Fabrication of hot formed and heat treated secondary bumper bars.

19b-68. Trailer Fabrication at Steel Products Company, Inc. Gerald E. Stedman. *Modern Industrial Press,* v. 10, May 1948, p. 38, 40, 42.
Press operations and materials handling.

19b-69. Automatic Equipment Speeds-up Production at Schnefel Brothers. Floyd McKnight. *Modern Industrial Press,* v. 10, May 1948, p. 44, 46.
Press and machine-shop operations in production of a variety of manicure scissors, nippers, tweezers, clips and files.

19b-70. Steel Shapes Formed by Cold Extrusion. Kenneth Rose. *Materials & Methods,* v. 27, May 1948, p. 68-71.
Tubular, cylindrical, and other symmetrical forms can be produced by a process which resembles impact extrusion, except that more steps are required.

19b-71. How Conversion to Other Materials Solved Malleable Castings Shortage. Herbert Chase. *Materials & Methods,* v. 27, May 1948, p. 89-92.

Truck components were converted to forgings or to stampings with savings in cost and weight. Tooling costs were generally higher but were soon offset by lowered piece costs.

19b-72. Wheelbarrows and Garden Implements. *Western Machinery and Steel World,* v. 39, May 1948, p. 74-79.

Forging and welding operations.

19b-73. Modern Universal Slabbing Mills. A. R. Kruse. *United Effort,* v. 28, May 1948, p. 3-5.

19b-74. Compound Die Cuts Off, Forms, Curls. Joseph J. McGuinness. *American Machinist,* v. 92, May 20, 1948, p. 106-107.

Reduces from six to one the number of operations required to manufacture a steel valve part used in an air-control device.

19b-75. Increased Forging Die Life. Herbert Chase. *Iron Age,* v. 161, May 27, 1948, p. 88-94.

Study of die lubrication and other factors causing die deterioration has reduced die steel consumption and scrap losses.

19b-76. Multiple Piercing Dies for Making Motor Laminations. *Machine and Tool Blue Book,* v. 44, June 1948, p. 183-184, 186-187.

By replacing notching dies with multiple-piercing dies in the manufacture of motor laminations, substantial savings in die costs were made. Production was also increased and four punch presses were freed for other jobs.

19b-77. New Self-Contained Line for Making Stabilizer Bars. *Automotive Industries,* v. 98, June 1, 1948, p. 40-41.

Miscellaneous press operations.

19b-78. Unconventional Methods Used to Make U-Flex Piston Rings. *Automotive Industries,* v. 98, June 15, 1948, p. 38-39, 74.

Steps required to produce the above from S.A.E. 1095 steel in coil form by a series of forming operations, followed by heat treating, grinding, burring, and polishing.

19b-79. Advantages of Shot-Peening. Alberto Oreffice. *Metal Progress,* v. 53, June 1948, p. 848-849.

Data on two series of tests on spring materials. Highly beneficial effects of shot-peening are indicated from tests on S.A.E. 9260, Si-Mn, leaf-spring stock and S.A.E. 1070 coil-spring stock.

19b-80. Complete New Press Line Makes Frames for the New Ford. P. D. Aird. *Modern Industrial Press,* v. 10, June 1948, p. 13-14, 18, 50.

19b-81. The Relationship Between Cold-working and Hydrogen Embrittlement. C. A. Zapffe and M. E. Haslem. *Wire and Wire Products,* v. 23, June 1948, p. 475-478, 527-529.

Samples of 1/16-in., 440-C, stainless-steel wire were cleaned and exposed to hydrogen, then tested in a single-bend constant-rate machine, immediately and also after exactly 30 and 90 sec., respectively. Effects of laboratory and mill annealing, cold work, and temperature of pickling. 10 ref.

19b-82. Nature of the "Forging Cross" in Steel. (In Russian.) V. I. Arkharov, N. V. V'yal, and K. A. Malyshev. *Zhurnal Tekhinicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 219-223.

Phenomenon consists of a clearly visible cross-shaped design which appears on the etched surface of specimens which were rotated during forging, between blows of the hammer, to positions at right angles to each other. Attempts to explain this phenomenon on the basis of a particular distribution of coarse and fine grains which is thus produced.

19b-83. 1948 Hudson Press-Work. *Tool & Die Journal,* v. 14, July 1948, p. 41-45.

19b-84. Tooling and Production of the Apex Fold-A-Matic Ironer. Carl F. Benner. *Tool & Die Journal,* v. 14, July 1948, p. 52-54, 56, 58, 108-109.

Drawing, trimming, and piercing the table top, and design and production of brackets and reinforcing members.

19b-85. Expands Wire Producing Facilities. *Steel,* v. 123, July 12, 1948, p. 114-116.

Jones & Laughlin's $2,000,000 program includes installation of 55 new wire drawing machines, a rod cleaning unit, annealing furnaces, 14 new nail machines, and other plant improvements.

19b-86. Forging the "Impossible". Herbert Chase. *American Machinist,* v. 92, July 15, 1948, p. 114.

How fireman's tool having two prongs at right angles to each other and to the handle was forged.

19b-87. Threads Rolled in Screw Machines. C. R. Morgan. *American Machinist,* v. 92, July 15, 1948, p. 116.

Special tool which gives high-finish threads up to ½-in. diameter on automatic machines.

19b-88. Shotpeening. Fred K. Landecker. *SAE Quarterly Transactions,* v. 2, April 1948, p. 191-194, 200.

Previously abstracted from condensed version in *SAE Journal,* v. 56, Jan. 1948, p. 65. See item 19b-9, 1948.

19b-89. Selection of Steels for Forging. Lester F. Spencer. *Steel Processing,* v. 34, June 1948, p. 297-301, 305.

A general review. Begins with steel manufacture, and reviews properties and effects of heat treatment. (To be continued).

19b-90. Tooling Trick Raises Tool Life Five or Six Times. Frederick Lovell. *Fasteners,* v. 5, no. 1, 1948, p. 10-11.

Product required was a high-carbon U-bolt made from ⅝-in. stock. The die setup originally used consisted of solid pieces. Revision so as to use inserts of hard toolsteel made it possible to replace the worn portions of the tool only. In addition, the inserts could be used several times by turning end-for-end, or by turning them over.

19b-91. Operation and Maintenance of Automatic Preset Plate Mill Screwdown Control. *Iron and Steel Engineer,* v. 25, July 1948, p. 37-41; discussion, p. 41-42.

Joseph F. Skalka describes electrical features and R. G. Uhler mechanical features of above control on 120-in. plate mill.

19b-92. Novel Billet Descaler Aids Forging. *Iron Age,* v. 162, July 15, 1948, p. 79.

Descaling heated round billets in the forge shop of International Harvester Co. is accomplished by simple, motor-driven machine.

19b-93. Driven Backup Rolls Used in Cold Strip Mill. *Iron Age,* v. 162, July 15, 1948, p. 90-91.

A four-high, reversing cold strip mill designed to overcome drive deficiencies, strip breakage, and other disadvantages of the standard Steckel mill. Results of production use of an experimental 10-in. unit on light gages; specifications for a larger mill of the same design.

19b-94. Low Alloy High Tensile Steels. *SAE Journal,* v. 56, July 1948, p. 21-23. Based on **Practical Usage of Low Alloy High Tensile Steels in Automotive Structures** by C. L. Altenburger. (To be published in full in *SAE Quarterly Transactions.*)

Applications and advantages of the above steels as replacements for mild carbon steels. Forming of these alloys and relative influence of uniform and total elongation on a high-tensile steel and a low-carbon deep-drawing steel.

19b-95. Progressive Dies Help Chevrolet Meet Demand for Heavy Gage Parts. P. D. Aird. *Modern Industrial Press,* v. 10, July 1948, p. 13-14,18.

19b-96. Unique Hulson Draft Gear Involves Forming & Welding. Walter Rudolph. *Modern Industrial Press,* v. 10, July 1948, p. 34, 36, 38.

Job that primarily involves forming and welding of steel tubing and plate, replacing castings in heavy-duty parts for railway-car understructure.

19b-97. Forging a Miniature Crankshaft. John Mueller. *Industrial Heating,* v. 15, July 1948, p. 1132, 1134.

Forging an alloy-steel crankshaft for a miniature gasoline motor. A typical example of hot working small forgings on closed impression dies.

19b-98. World's Largest Mechanical Forging Press. *Steel Processing,* v. 34, July 1948, p. 356-357.

800-ton press to be used for the mass production of automobile crankshaft forgings.

19b-99. Press-Fabricating Pipe on Converted 36-Foot Press and Specially Designed Welding Mill. *Steel,* v. 123, July 26, 1948, p. 84, 87.

Equipment and procedures.

19b-100. How Packard Whips Tough Forging Jobs. George Daschke and Harold Lawson. *American Machinist,* v. 92, July 29, 1948, p. 73-77.

Solution of some unusual but typical problems.

19b-101. Mile-a-Minute 5-Strand Tandem Mill Now in Operation. A. J. Winchester. *Electrical Engineering,* v. 67, Aug. 1948, p. 742-746.

Tin-plate cold reduction mill. Emphasizes electrical controls.

19b-102. The Manufacture of Bolts and Nuts. R. C. Rhoades. *Steel Processing,* v. 34, July 1948, p. 351-355.

A clear description of the various methods and equipment used. This installment deals with steel required and its preliminary treatment; cold heading; hot forging of bolts; and two of the five methods for nut manufacture—cold punching and cold forging. (To be continued.)

19b-103. Large Stainless Steel Tank Heads Fabricated by Spinning. *Materials & Methods,* v. 28, Aug. 1948, p. 56-58.

Successful spinning of large 18:8 stainless steel tank heads on a production basis by the Milwaukee Metal Spinning Co.

19b-104. Skimmer Disks Produced Faster by Spinning. G. H. Cottrell.

American Machinist, v. 92, Aug. 26, 1948, p. 78-80.

How 6000 cream-separator components per day are processed to close tolerances by high-production setup.

19b-105. Interesting Stamping Operations at Norris Stamping and Manufacturing Co. Gerald Eldridge Stedman. *Machine and Tool Blue Book,* v. 44, Sept. 1948, p. 113-118.

The deep drawing of square washing-machine tubs and fabrication of collapsible spouts.

19b-106. Output of Tin Plate Gages Increased 74 Per Cent by Use of Forged Sleeves on Back-Up Rolls. *Steel,* v. 123, Sept. 6, 1948, p. 111, 128, 130.

19b-107. Progressive Die Scores, Trims and Forms Heavy Shell. Theodore Oshinsly. *American Machinist,* v. 92, Sept. 9, 1948, p. 85.

Six-in. shell is made from 0.109-in. thick C.R. steel half-hard temper.

19b-108. Rolling Screw Spikes. *Fasteners,* v. 5, No. 2, (1948), p. 14-15.

The development of satisfactory dies for rolling these screw spikes, during which numerous difficulties were encountered.

19b-109. High Creep Strength Austenitic Steel Tubes. G. T. Harris and W. H. Bailey. *Metallurgia,* v. 38, Aug. 1948, p. 189-192.

The development of heat-resisting steel tubes for use in heat exchangers for gas turbines. Manufacturing procedure, mechanical properties, structure, and welding.

19b-110. Producing Wide Stainless-Steel Sheets at Republic Steel Corporation's New Plant. *Machinery,* v. 55, Sept. 1948, p. 205-206.

Processes include cold reducing, annealing, pickling, and slitting and cutting.

19b-111. Automatic Spinning of Stainless Steel. Arnold Hildebrandt. *Tool Engineer,* v. 21, Sept. 1948, p. 20-22.

Procedure for production of cones for television cathode-ray tubes from Type 446 stainless steel.

19b-112. Pressure Tanks; Output Must Conform to Rigid Standards. *Western Metals,* v. 6, Sept. 1948, p. 32-33.

Stamping, forming, and drawing operations in the manufacture of propane and acetylene tanks.

19b-113. Shearing Operations in New Columbia Mill. *Western Metals,* v. 6, Sept. 1948, p. 31.

19b-114. Air Power Forges Marine Parts. *Applied Hydraulics,* v. 1, Sept. 1948, p. 20-21.

A forge shop making marine parts uses air-operated forging machines to increase production, simplify die changes, and reduce maintenance cost.

19b-115. Selective Shot Peening Extends Fatigue Life. J. Epprecht and H. W. Eberhardt. *American Machinist,* v. 92, Sept. 23, 1948, p. 95-98.

Stronger propeller hubs and operating units are produced without undesirable weight increase. Molded rubber masks protect all surfaces of special interrupted spiral bevel gear except the teeth.

19b-116. Robot Press Forges Heavy-Duty Parts. *American Machinist,* v. 92, Sept. 23, 1948, p. 124-125.

5000-ton press and "manipulator" at Cameron Iron Works, Houston, Texas. 900-lb. blanks are handled; four men handle forging of piping elements.

19b-117. Presses Play Significant Role in Construction of Bus Bodies. Floyd McKnight. *Modern Industrial Press,* v. 10, Sept. 1948, p. 38, 40, 42, 44.

19b-118. New Phosphate Material Used for Wire-Drawing. *Steel Processing,* v. 34, Sept. 1948, p. 475-476.

Use of "Banox", an amorphous metaphosphate permits an increase of 20 to 25% in the speed of drawing fine high-carbon wire.

19b-119. Steels for Forging. Part IV. The Nickel-Chromium Alloys; Evaluation and Control of Forging Steel. Lester F. Spencer. *Steel Processing,* v. 34, Sept. 1948, p. 479-482.

Properties and compositions of the various types of forging steel; and forging methods. The work of Clark and of Ihrig for "hot twist" evaluation of the effect of various elements on forgeability. 35 ref.

19b-120. The Development of Continuous Hot and Cold Rolling of Flat Rolled Iron and Steel Products. S. E. Graeff. South Wales Institute of Engineers, (Cardiff, Wales), 1948, 52 pages. Reprinted from *Proceedings of the South Wales Institute of Engineers,* v. 63, no. 3, p. 159-211.

A history of the development of the flat-rolled steel industry in the U. S. with particular reference to the period from 1912 to the present.

19b-121. Republic Expands Stainless Finishing Capacity. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 62-63.

Rolling, annealing, and pickling facilities.

19b-122. Republic's New 48-In. Mill at Youngstown, Ohio. T. J. Ess. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 69-71.

19b-123. Handling and Fabricating Methods for Producing the Lustron

Home. Ernest Olsen. *Finish,* v. 5, Oct. 1948, p. L9-L11.

Forming and welding equipment and procedures.

19b-124. Stamping Data. II and III. *American Machinist,* v. 92, Oct. 7, 1948, p. 137, 139.

Practices followed by automobile manufacturers and agricultural-implement makers.

19b-125. The Control and Production of High Carbon Wire. Jerry G. Weiss. *Wire and Wire Products,* v. 23, Oct. 1948, p. 884-887, 994.

Control methods involved in the different processes connected with the production of high-carbon wire. Drawing and patenting.

19b-126. Wire Drawing Research in the British Iron and Steel Research Association. W. C. Hessenberg. *Wire and Wire Products,* v. 23, Oct. 1948, p. 904-907, 980.

Wire-drawing research with particular emphasis on the back-pull factor and its effect on dies. 11 ref.

19b-127. Stainless Sheet Output Boosted by New Mill. *Production Engineering & Management,* v. 22, Oct. 1948, p. 69-73.

Cold reducing and finishing facilities.

19b-128. Fundamentals of Forging Practice, IX and X. Waldemar Naujoks. *Steel,* v. 123, Sept. 27, 1948, p. 89-92, 116, 118; Oct. 11, 1948, p. 101-102, 104, 123-124.

Discussion of nonforging shop operations; heat treatments and equipment, scale removal by tumbling, blast cleaning, and pickling. Various types of inspection procedures used in the forging plant.

19b-129. Shot Quality; How it Affects Fatigue Life. F. P. Zimmerli. *Steel,* v. 123, Oct. 18, 1948, p. 126-129.

Results of an investigation to discover how shot hardness affects endurance limit of shot-peened helical springs. Five lots of white-iron shot and one of steel.

19b-130. Fabricating Hollow Steel Airplane Propellers. Arthur Q. Smith. *Industrial Gas,* v. 27, Oct. 1948, p. 14-15, 35-36.

Forming, welding, and annealing procedures and equipment.

19b-131. The West Gets a New Steel Mill. *Western Metals,* v. 6, Oct. 1948, p. 24-30.

Columbia Steel's new cold reduction plant. Plant layout and various pieces of equipment. Units for rolling, cold reduction, electrolytic cleaning and tinning, coil annealing, hot dip tinning, and trimming.

19b-132. Added Facilities Increase Republic's Stainless Steel Capacity. R. T. Willson. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1203-1206.

New cold reduction mills and auxiliary equipment.

19b-133. How Surface Peening Improves Metal Parts. Rick Mansell. *Steel Processing,* v. 34, Oct. 1948, p. 549-551, 556.

The mechanism of surface peening; how it is done commercially; and applications.

19b-134. Hoes for Export Produced at Hercules Forge. Thomas A. Dickinson. *Steel Processing,* v. 34, Oct. 1948, p. 552-553.

Equipment and procedures.

19b-135. Practice and Theory in Drawing Mild Steel. Nestor Piret. *Wire Industry,* v. 15, Oct. 1948, p. 665-667, 672.

A Dutch engineer presents practical formulas and graphs, resulting from theoretical analysis and data for a multihole accumulation-type machine. Calculated and measured power agree quite well.

19b-136. Republic's 44-36-32 in. Mills at Chicago. R. F. Lavette. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 37-40; discussion, p. 40-41.

Mills and their auxiliary equipment.

19b-137. Columbia Steel's New Sheet and Tin Mill. Paul F. Kohlhaas. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 42-58.

Layout for new mill in Pittsburg, Calif.

19b-138. Greater Forming Efficiency Provided by New Process. *Steel,* v. 123, Nov. 1, 1948, p. 92.

Forming of steel gas cylinders, upsetting sections of tubing to increase wall thickness, sealing tube ends, necking-down tube sections and other operations of a related nature on low-carbon or alloy steel, brass, and other metals with greater efficiency by a process utilizing a combination of electrical current and pressure.

19b-139. Large Plate-Bending Machine. *Engineer,* v. 186, Oct. 15, 1948, p. 399.

British three-roll machine, designed for bending stainless-steel plates up to 22 ft. long by 1 in. thick into complete cylinders.

19b-140. Hot Pressed Formed Parts for Heavy Construction. Herbert A. Ottey. *Product Engineering,* v. 19, Nov. 1948, p. 113-116.

Use, giving materials, tolerances, and typical applications. The relationship between the radius of

curvature and the thickness of the material.

19b-141. Shot Peening. Effect of Shot Type on Spring Fatigue Life. Why Peening Calls for Uniform Shot. *SAE Journal,* v. 56, Nov. 1948, p. 36-39. Based on articles by F. P. Zimmerli and John Straub, respectively.

Original papers were presented at a recent meeting of the Shot Peening Division of the S.A.E. Iron and Steel Technical Committee.

19b-142. Building the Peacetime Jeep. William E. Paris. *Machinery,* v. 55, Nov. 1948, p. 194-201.

Outstanding forging, machining, and stamping operations employed.

19b-143. Wire-Drawing Speed Increased 25% by Use of Phosphate Lubricating Compound. *Steel,* v. 123, Nov. 8, 1948, p. 102, 132.

Use of amorphous metaphosphate known as "Banox".

19b-144. Drawing Stainless Milker Pails. Walter Ellingboe. *Iron Age,* v. 162, Nov. 11, 1948, p. 94-97.

Improved drawing properties and surface finish of stainless steel, improved die construction, better draw compounds, and other manufacturing refinements have reduced from five to four the number of draws and from two to one the number of bulging operations required in producing 50 and 70-lb. milker pails. Fewer anneals are also required.

19b-145. Modern Cold Forging Practice. J. H. Friedman. *Iron Age,* v. 162, Nov. 11, 1948, p. 98-105.

Developments in cold forging during the past 10 years have completely outmoded and made obsolete equipment built prior to that time. Typical work being done on improved machines.

19b-146. Instrument Panels for New Hudsons Keep One Pressroom Section Busy. P. D. Aird. *Modern Industrial Press,* v. 10, Oct. 1948, p. 13, 16, 18, 24.

Equipment used.

19b-147. Step-by-Step Manufacture of the "Dan-Dee" Metal Basket. Walter Rudolph. *Modern Industrial Press,* v. 10, Oct. 1948, p. 40, 42, 44, 46.

Steps involved — mostly forming operations.

19b-148. The Effect of Shot-Peening Upon the Corrosion-Fatigue of a High-Carbon Steel. A. J. Gould and U. R. Evans. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 164-168.

Steel peened in seven different ways was subjected to corrosion-fatigue in very dilute H_2SO_4 and in sea water; fine-ground unpeened steel was also tested. It was found that peening greatly increased the endurance at common stress ranges. Addition of sodium carbonate and sodium bicarbonate to sodium chloride diminished the endurance of peened specimens; at high alkali contents, peened specimens have a shorter life than finely ground specimens.

19b-149. Metallurgical Control of Deep Drawn Stampings from Cold Rolled Steel. Part I. N. E. Rothenthaler. *Tool & Die Journal,* v. 14, Nov. 1948, p. 46-49.

The necessary steps in the design and construction of new dies for an automobile body. Surface and internal-quality factors in production of steel for the above. Use of "Cerrobend" alloy for making small experimental dies. (To be continued.)

19b-150. Cylinders Formed, Welded Automatically. *Machine Design,* v. 20, Nov. 1948, p. 154-155.

Machine for the above. The products are plain sheet-steel open-end cylinders.

19b-151. La fabrication des tubes metalliques sans soudure. (Fabrication of Metal Tubes Without Welding.) R. Stettler. *Pro-Metal,* v. 3, May 1948, p. 84-95.

Swiss methods.

19b-152. Cold Reduced Sheet and Tin Plate Plant Increases Output of Columbia Steel by More Than 300,000 Tons. *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1325-1331.

19b-153. The Electrification of the Cold Reduction Mill of the Columbia Steel Mill. F. R. Grant. *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1347-1354.

19b-154. The Uni-Temper Mill. A. I. Nussbaum. *British Steelmaker,* v. 14, Nov. 1948, p. 503-508.

Details of this type of mill and its advantages. It was first put into commercial use in the U. S. in 1944.

19b-155. "Watch The Fords Go By"— With Western Mouldings. *Western Metals,* v. 6, Nov. 1948, p. 19.

Production of rolled metal mouldings and stampings for Ford automobiles.

19b-156. Mass Production of Steel Reinforcing Units. Newell Farrar. *Western Metals,* v. 6, Nov. 1948, p. 20-21.

Forming and welding in fabrication of cage-like units ready for placement in forms prior to pouring of concrete.

19b-157. Wear Resistance of Wire for Wire Rope. Reginald S. Brown. *Wire and Wire Products,* v. 23, Nov. 1948, p. 1037-1047, 1061-1062.

Reliable method developed for determining the surface-flow characteristics of patented steel wires. Results indicate large differences in the behavior of wires produced by different methods. Effects of composition, patenting method, and amount of cold work.

19b-158. New Cold Mill at Weirton Increases Tin Plate Capacity. C. J. Klein. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 37-48; discussion, p. 48.

19b-159. Spun Stainless Venturi. Leslie F. Hawes. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 109.

The venturi is made from two disks, 9 and 11 in. in diameter, and is welded after forming.

19b-160. Western Cold Rolled Steel. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 122.

New cold-reduction sheet and tinplate mill.

19b-161. Stamping Buick Bumper Guards. Herbert Chase. *Iron Age,* v. 162, Nov. 25, 1948, p. 90-91.

Four men operate five presses that draw, form, and trim bumper guards. Studs are then welded to the inside of the guard in a fast-moving, wheeled fixture arrangement. The production-line setup.

19b-162. Production of Drop-Forged Crankshafts for Use in High-Compression Engines. H. A. Whiteley. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 133-137, 141.

British methods and equipment, including inspection and heat treatment.

19b-163. Fundamentals of Forging Practice. XIII and XIV. Waldemar Naujoks. (Concluded.) *Steel,* v. 123, Nov. 22, 1948, p. 56-71, 110; Dec. 6, 1948, p. 121-122, 124, 127, 158, 160, 162.

Nov. 22 installment reviews design characteristics of forging machine and press forgings, heat treating considerations, and amount of metal to be allowed for subsequent machining operations. Final installment is a dictionary of terms used in the forging industry.

19b-164. New High-Speed Rod Mill Utilizes Electronic Speed Regulation. G. M. Harvey and D. M. Allison. *Steel,* v. 123, Dec. 6, 1948, p. 134, 136, 138.

As applied by Laclede Steel Co.

19b-165. Rolling Raised Steel Type Characters. Herbert Chase. *Iron Age,* v. 162, Dec. 9, 1948, p. 111-114.

How round steel blanks, set in holder on a floating spindle of a milling machine, are rolled against engraved type-character dies, yielding clean, sharp, type characters of accurate dimensions for business machines. Manufacturing setup, die construction, and other details.

19b-166. Coil Spring Production Boosted to 650 Per Hour. *Steel,* v. 123, Dec. 13, 1948, p. 87.

Forming and heat treating.

19b-167. Wiredrawing? Shucks—There Ain't no Such Animal. *Mainspring,* v. 12, Dec. 1948, p. 1-4.

An "intelligent mechanic" tells why wire drawing of steel is impossible, from the fundamental point of view. It is then shown that the mechanic is right except that he neglected the effect of the protective coating of hydrated lime, known as "sull". How this and other pretreatments were developed.

19b-168. The Effect of Various Elements on the Hot-Workability of Steel. Harry K. Ihrig. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron ad Steel Division, 1946, p. 749-777; discussion, p. 777-790.

Previously abstracted from *Metals Technology,* Oct. 1945, T. P. 1932. See item 19-313, 1945.

19b-169. Progress in Steel Pipe Manufacture with Particular Reference to Seamless Pipe. E. N. Sanders. *Yearbook of the American Iron and Steel Institute,* 1947, p. 446-454; discussion, p. 454-458.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 19-156, 1947.

19b-170. Design of a Mill for Rolling Semifinished Products. J. J. Curtin. *Yearbook of the American Iron and Steel Institute,* 1947, p. 495-506; discussion, p. 507-509.

Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 19-158, 1947.

19b-171. The Joliet Coarse Rod Mill. R. R. Snow. *Yearbook of the American Iron and Steel Institute,* 1947, p. 509-516; discussion, p. 516-518.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 35, June 1947, p. 687-690. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 19-179, 1947.

19c—Nonferrous

19c-1. Molybdenum and Tungsten Wire Drawing. *Industrial Diamond Review,* v. 7, Nov. 1947, p. 329-331. Based on B.I.O.S. Final Report No. 684, Item No. 21, "Production of Molybdenum and Tungsten for Radio Valves and Electric Lamps, Metallworker Plansee, Reutte, Tyrol."

19c-2. Production of Instrument Wires in Germany. *Industrial Diamond Review,* v. 7, Nov. 1947, p. 344. Based on B.I.O.S. Final Report No. 1357, Item No. 9.

19c-3. Structure d'Emboutissage des Metaux Usuels. (Structure Resulting From Stamping of Ordinary Metals.) Part I. J. Tennevin and R. Michaud. *Métaux et Corrosion,* v. 22, July 1947, p. 109-119.

The structures of sheets of various types of aluminum and brass, both before and after stamping, were studied using X-ray diffraction. The nature of the deformation upon stamping. 28 ref. (To be continued.)

19c-4. The Hydraulic Extrusion Press in the Light of Latest Developments and Its Scope in Nonferrous Metal Production. Joseph Bronner. *Machinery Lloyd* (Overseas Edition), v. 19, Dec. 20, 1947, p. 68-71.

Practical principles of operation; extrusion properties of common metals and alloys; typical applications.

19c-5. Effect of Processing Variables on Stress Required in Drawing Tubular Brass Parts. George Espey and George Sachs. *Steel,* v. 122, Feb. 16, 1948, p. 82-84, 114, 116.

Results of research at Case Institute of Technology, sponsored by Frankford Arsenal. Variations in tube dimensions, contour and finish of die and punch, temper and surface condition of tubular parts, and lubricant.

19c-6. Wire, Machines and Processes Mean Better Cold Headed Brass. Walter D. France. *American Machinist,* v. 92, Feb. 12, 1948, p. 96-97.

Changes in design put more importance on composition, microstructure, temper, and surface of material for best production.

19c-7. Structure d'Emboutissage des Metaux Usuels. (Structure Resulting From Stamping of Ordinary Metals.) Parts II and III. J. Tennevin and R. Michand. *Metaux et Corrosion,* v. 22, Aug. 1947, p. 130-138; Sept. 1947, p. 142-145.

Part II covers spherical and cylindrical stamping dies, and their effects on metallic structure of aluminum and brass. Conclusion discusses conical stamping and effects on aluminum of different impurities. The value of X-rays in making this study is stressed and its application to the study of other industrial problems is urged. 11 ref.

19c-8. Oneida, Ltd., Uses Large Number of Modern Presses to Make Famous Hollow Ware Line. Floyd McKnight. *Modern Industrial Press,* v. 10, Feb. 1948, p. 32, 34, 36.

19c-9. A Sixteen-Station Progressive Die. Hans Effgen. *Tool & Die Journal,* v. 13, March 1948, p. 69-71.

The 16 steps required for formation of socket contact from 0.010-in. Be-Cu strip. This contact is required to have a holding or gripping power of 170 g. when the 0.030-in. diameter portion is pushed onto a smooth wire measuring 0.040 in. in diameter.

19c-10. High Speed Stamping of Electrical Terminal Plugs. Herbert Chase. *Iron Age,* v. 161, March 18, 1948, p. 64-72.

Through intricate tooling of U. S. Multi-Slide machines, a progressive die arrangement blanks and forms hard brass and beryllium-copper strip into electrical terminals at rates up to three per sec., holding extremely close dimensional tolerances at critical points.

19c-11. Soft Alloys Used to Make Short Run Sheet Metal Dies. Kenneth Rose. *Materials & Methods,* v. 27, March 1948, p. 83-85.

Nitrogen hardened soft metals can be used to produce dies and sample parts within 24 to 48 hr., as compared to weeks required when the usual die materials were used. The alloy is a variation of Wood's metal known as Cerrobend.

19c-12. Combination Die to Bend and Cut Wire. Federico Strasser. *Tool Engineer,* v. 20, April 1948, p. 34.

Designed for production of a specific piece made from copper wire.

19c-13. Application of Heat to Swaged Tungsten Permits Parts to Be Machined. Dan White and J. J. Aust, Jr. *Materials & Methods,* v. 27, April 1948, p. 81.

Parts are heated by an oxy-acetylene torch positioned on a lathe. Head stock of lathe is cooled by air during operation.

19c-14. The Texture of Copper Wire Drawn With Backpull. J. F. H. Custers. *Physica,* v. 13, Aug. 1947, p. 366-378.

In wire drawn with backpull, the so-called conical fiber texture which predominates developed less intensively than in wire drawn in the normal way. It is, however, still questionable whether properties like tensile strength are improved sufficiently to justify use of backpull.

19c-15. Distribution of Deformation Throughout the Volume of Metallic Crystals During Formation of Slip Bands. (In Russian.) D. G. Kurnosov, N. M. Tronina, and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 197-206.

Distribution in a zinc crystal was studied experimentally. It was shown that, for small deformations, only an insignificant part of the total deformation is localized in the slip band, most of it being distributed throughout the entire volume.

19c-16. Hubbed Cavities—Their Influence on Die Casting Design. H. M. Newell and Theodore T. Sossner. *Die Castings,* v. 6, July 1948, p. 33-34, 50-52.

Hubbing—usually called hobbing—is the process of creating a die cavity by displacement and flow of metal. This is done by forcing a hardened master, called the hub, into a block of soft steel. Methods and advantages for preparing die cavities.

19c-17. Drawing Copper Wire at Western Electric's Tonawanda Plant. *Wire and Wire Products,* v. 23, July 1948, p. 589-593.

19c-18. Modern Developments in Metal Bellows; The "Hydroflex" Equipment. *Aluminium and the Non-Ferrous Review,* v. 13, Jan.-March 1948, p. 15.

Brass bellows made by forming a thin walled tube under hydraulic pressure in a collapsible die. The metal flows transversely as pressure is applied, so that the bellows are formed in one continuous operation. The outstanding advantage is that any defective tube bursts under the high internal pressure. Also the unit is free from uneven stress distribution because of complete absence of any marking from tools used for spinning or rolling.

19c-19. Effect of Some Processing Variables on the Stress Required to Draw Tubular Parts. George Espey and George Sachs. *Transactions of the American Society of Mechanical Engineers,* v. 70, April 1948, p. 233-239.

Variations studied were in tube dimensions, contour and finish of the die and punch, temper and surface condition of the parts, and the lubricant for drawing tubular brass parts. Draw stress for a given reduction increased with decreasing die angle, this being the most important die variable. Radiused dies behaved in a manner similar to conical dies of the same contact area. Other die variables investigated had little effect upon draw stress. A number of lubricants were investigated, none of which excelled a 2% aqueous soap solution.

19c-20. Verfestigte Bleibronzen. (High-Strength Lead Bronzes.) B. Garre. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 408-412.

Experiments showed that hardness and tensile strength of the above can be greatly increased by cold working. Practical methods for strengthening lead-bronze bearings and the structural changes which occur during the process.

19c-21. The Effect of Cold Working on the Magnetic Properties of Pure Metals. James Reekie and T. S. Hutchison. *Physical Review,* ser. 2, v. 74, Sept. 1, 1948, p. 610-620.

This strain sensitivity of susceptibility cannot be accounted for by the presence of ferromagnetic impurities, but appears to be related to certain metallurgical changes which occur on cold working. A plausible explanation. 19 ref.

19c-22. Forming and Heat Treatment of Corrugated Diaphragms. R. I. Jaffee, E. I. Beidler, and R. H. Ramsey. *American Society for Metals, Preprint* No. 16, 1948, 20 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 460-477; discussion, p. 478-479.

The amount of cold deformation resulting from forming corrugated diaphragms of Be-Cu, 60:20:20 Cu-Ni-Mn, titanium-Elinvar (Ni-Span C), and Grade A phosphor bronze. Results of tensile tests on material age hardened in the as-received condition and with additional cold reduction of the order of 10% of the thickness.

19c-23. Brass Wire Processing. Christian Witteveld. *Wire and Wire Products,* v. 23, Oct. 1948, p. 876-880, 992-993.

The processes involved, including extrusion, drawing, lubricants, annealing, cleaning and handling.

19c-24. The Working Behavior of Phosphorus-Deoxidized Coppers Containing Bismuth. A. P. C. Hallowes. *Journal of the Institute of Metals,* v. 75, Sept. 1948, p. 1-18.

Nonarsenical coppers containing up to 0.1% Bi were rolled in the laboratory and arsenical and nonarsenical coppers containing up to 0.01% Bi were fabricated into tube and strips on a plant scale. Bismuth contents higher than those usually tolerable will not introduce fabricating difficulties if the temperature of hot working, or of annealing prior to cold work is substantially increased, and if intermediate annealing is followed by quenching. The heat treatment necessary to avoid embrittlement.

19c-25. Designing Copper-Base Alloy Hot Die Pressings. F. S. Hyde. *Materials & Methods,* v. 28, Oct. 1948, p. 89-91.

19c-26. Composition and Properties of Nonferrous Alloys for Stampings, Including Deep-Drawn Parts. *Materials & Methods,* v. 28, Oct. 1948, p. 103, 105.

For eight brasses, three aluminums, three magnesiums, and zinc.

19c-27. Germany Extrudes Intricate Brass Shapes. *Product Engineering,* v. 19, Nov. 1948, p. 109. Based on PB 25664, "The Extruded Brass Rod Industry in Germany," Office of Technical Services. Dept. of Commerce, Washington. $1.75.

Production of hollow brass sections of intricate design on a 750-ton press.

19c-28. Production of Bronze Wire From Centrifugally Cast Plate. *Machinery* (London), v. 73, Nov. 4, 1948, p. 639. Based on B.I.O.S. Report No. 1797.

German method.

19c-29. Nameplates — Forming and Porcelain Enameling. Sam A. Higginbottom. *Ceramic Industry,* v. 51, Dec. 1948, p. 66-67.

19c-30. Les procédés de fabrication des usines métallurgiques Suisses. Le filage des tubes et des barres. (Fabrication Processes in the Swiss Metallurgical Industry. Tube and Extrusion Presses.) (Also in German.) O. H. C. Messner. *Pro-Metal,* v. 1, July 1948, p. 108-115.

Particular reference to copper and copper alloys. (To be continued.)

19c-31. Mechanical Working of Tantalum. Rupert H. Myers. *Metallurgia,* v. 39, Nov. 1948, p. 7-10.

Techniques for swaging, rolling, and wire-drawing the metal, with particular reference to the problem of lubrication in drawing. The effect of cold-working on density and a method of spot-welding it to itself and to other metals.

19d—Light Metals

19d-1. Spinning and Panel-Beating of Aluminum Alloys. Part II. E. R. Yarham. *Modern Machine Shop,* v. 20, Jan. 1948, p. 138-140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160.

The technique employed in spinning aluminum alloys in Britain. (To be continued.)

19d-2. Aluminum Sheet. *Automobile Engineer,* v. 37, Dec. 1947, p. 497.

Production factors affecting grain size including influence of hot working and of annealing the slabs.

19d-3. Shot-Peening Aluminum Forgings. *Machinery* (London), v. 71, Dec. 11, 1947, p. 651-656.

Methods and equipment used at Pratt & Whitney Aircraft Division, East Hartford, Conn.

19d-4. Bending and Forming of 75S-T Aluminum at Elevated Temperatures. M. L. Ochieano. *Machinery,* v. 54, Jan. 1948, p. 158-161.

Use of resistance heating process in bending and forming aluminum alloys, which has increased formability in many instances more than 150%.

19d-5. The Mechanical Working of Magnesium Sheets. R. Groves. *Machinery Lloyd* (Overseas Edition), v. 19, Dec. 20, 1947, p. 88-92.

Recommended procedures, including die design.

19d-6. Rolling Aids. *Light Metals,* v. 11, Jan. 1948, p. 43-45. Translated and condensed from article by Hemmerich, *Werkstatt und Betrieb,* v. 80, 1947, p. 192.

Devices to facilitate handling of aluminum sheet during rolling.

19d-7. Drawing Dies for Magnesium. Installment No. 9. James Walker. *Tool Engineer,* v. 19, Jan. 1948, p. 31-35.

Numerous diagrams showing design.

19d-8. Light Alloy Forgings; Methods Employed by German Technicians. *Metal Industry,* v. 72, Jan. 23, 1948, p. 72-73. Condensed from a recent B.I.O.S. report.

19d-9. Drawing Aluminum Tubing. Chas. T. Flachbarth. *Modern Metals,* v. 3, Jan. 1948, p. 20-21.

Types of drawing; working characteristics; control; and fields of application.

19d-10. Spinning and Panel-Beating of Aluminum Alloys. Part III. (Concluded). E. R. Yarham. *Modern Machine Shop,* v. 20, Feb. 1948, p. 132-134, 136, 138, 140, 142, 144, 146, 148, 150.

British tools and methods for hammering aluminum alloys.

19d-11. The German 30,000-Ton Light Metals Forge Press. G. S. Simpson, Jr. *Technical Data Digest,* v. 13, Feb. 15, 1948, p. 7-16.

Press was operated in Bitterfeld, Germany, by the I. G., from 1944 to 1945. Its history, and operation, application, and production factors.

19d-12. Works Practice in the Rolling and Extrusion of Aluminum at the Rogerstone Works of the Northern Aluminum Co., Ltd. Alastair McLeod. *Sheet Metal Industries,* v. 25, Jan. 1948, p. 73-91.

Extensive details of layout, methods, and equipment. Includes a description of annealing and heat treating procedures. (To be continued.)

19d-13. Postup Vyroby Hlinikovych Folii v Zavodech SSSR. (Description of Attempt to Produce Aluminum Foil by Methods Used in the U.S.S.R.) Petr Skulari. *Hutnicke Listy,* (Metallurgical Topics), v. 2, Dec. 1947, p. 121-124.

Methods used in the U.S.S.R. and variations from the Czechoslovakian process. Details of an attempt to duplicate the Russian process.

19d-14. Aluminum Goes to Press. Part I. E. V. Sharpnack. *Tool & Die Journal,* v. 13, Feb. 1948, p. 52-54, 70.

Information essential to successful specifying, handling, drawing, forming, blanking, and piercing of aluminum sheet stock.

19d-15. Spinning Magnesium. Leslie F. Hawes. *Iron Age,* v. 161, Feb. 19, 1948, p. 72-73.

Practical considerations. Lubricants for both hot and cold work; chromic acid cleaning solution formulas for removing graphite and other lubricants; and heating procedures for jobs demanding severe forming of the metal.

19d-16. New Brake Cuts Aluminum Foil Costs. *Modern Metals,* v. 4, Feb. 1948, p. 16-17.

Use of Linderman air-operated tension brakes on aluminum foil mills, double spoolers, and spooler and trimmer machines, to decrease down time for rethreading and to eliminate foil breakage due to undesirable variations in tension.

19d-17. Works Practice in the Rolling and Extrusion of Aluminum at the Rogerstone Works of the Northern Aluminium Co., Ltd. (Continued.) Alastair McLeod. *Sheet Metal Industries,* v. 25. Feb. 1948, p. 285-296.

Concludes description of the Robertson 14 x 32 in. two-high reversing mill for finish strip rolling; and describes the No. 2 hot mill, including the reheating and coil annealing furnaces, and also the plant for extrusion and wire drawing. (To be continued.)

19d-18. Works Practice in the Rolling and Extrusion of Aluminum at the Rogerstone Works of the Northern Aluminium Co., Ltd. (Concluded.) Alastair McLeod. *Sheet Metal Industries,* v. 25, March 1948, p. 491-496, 508.

Final installment describes the extrusion presses and heat treatment furnaces; as well as distribution systems for electricity, gas, water, and compressed air, the ventilation system, the cranes.

19d-19. The Manufacture of Aluminum Wire; Processes and Plant Described. *Wire Industry,* v. 15, March 1948, p. 185-186.

19d-20. Forming Magnesium and Aluminum. *Aircraft Production,* v. 10, April 1948, p. 138.

Comparative tests on a rubber press.

19d-21. La Déformation a Chaud des Métaux a la Presse et au Marteau-Pilon. I.—Forgeage de l'Aluminium et de ses Alliages. (Hot Deformation of Metals by Presses and Hydraulic Forging Hammers. I. Forging of Aluminum and Its Alloys.) Marcellin Chartron. *Revue de l'Aluminium,* v. 25, Feb. 1948, p. 37-43.

Types of aluminum and its alloys which may be forged. Methods of forging and installations.

19d-22. Forming Aluminum for New Type Dwellings. W. J. Granberg. *Sheet Metal Worker,* v. 39, April 1948, p. 55-56.

19d-23. Stretch-Forming Aluminum. *Western Machinery and Steel World,* v. 39, April 1948, p. 97; **Hydraulic Stretch Forming Machine.** *Sheet Metal Industries,* v. 25, April 1948, p. 766-767.

New North American Aviation machine obtained for stretch-forming. It is adaptable to many jobs previously done by drop hammers and other stretching and forming machines.

19d-24. Selecting Aluminum for Drawing and Forming Operations. *Reynolds Metals Technical Advisor,* v. 1, no. 7, 1948, p. 1-2.

19d-25. Tangent Bender Forms Camera Body Parts. *Iron Age,* v. 161, April 29, 1948, p. 94.

Use in manufacture of aluminum and aluminum alloy camera housings. The benders perform operations which are impractical by ordinary punch-press methods.

19d-26. Deep-Drawing One-Piece Aluminum Boat Hulls. *Machinery,* v. 54, May 1948, p. 174-176.

How Al-drawn shapes, believed to be the largest ever produced, are being formed from flat blanks in a single stroke.

19d-27. Extrusion and Drawing of Aluminum Alloys. *Metal Treatment,* v. 15, Spring 1948, p. 27-30, 46.

Methods and equipment of a British firm.

19d-28. Detroit Plant Concentrates on Magnesium Manufacture. P. D. Aird. *Modern Industrial Press,* v. 10, May 1948, p. 13-14, 18, 22, 24.

Stamping, forming, bending, of miscellaneous large and small Mg-sheet parts.

19d-29. Hydraulic Colossus. *Applied Hydraulics,* v. 1, May 1948, p. 17-18, 22.

Based on article in *Technical Data Digest,* v. 13, no. 4.

Use of a giant hydraulic forging press to produce aircraft light-alloy parts lighter, stronger and to finished limits faster than possible by previous fabricating methods.

19d-30. Stressed Aluminum. E. A. Owen, Y. H. Liu, and D. P. Morris. *Nature,* v. 161, May 1, 1948, p. 681-682.

Results of some investigations on high-purity aluminum, with regard to structural changes taking place during and after application of compressional stress. Differences of behavior of foils made by compressing annealed filings of aluminum in contrast to behavior of bulk aluminum. Effects of foreign atoms, and structures of filed and polished surfaces.

19d-31. Influence of Degree of Deformation on Relationship Between Stress and Rate of Deformation. (In Russian.) L. D. Sokolov. *Zhurnal Teknicheskoi Fiziki.* (Journal of Technical Physics), v. 18, Jan. 1948, p. 93-97.

As a result of experiments on compression of cylindrical specimens of different metals with various rate of deformation, it was found that the "rate coefficient" depends on the degree of deformation. 20 ref.

19d-32. La Deformation a Chaud des Metaux a la Presse et au Marteau-Pilon. II. Les Lois de l'Ecrasement; Applications et Conclusion. (Hot Deformation of Metals by the Stamping Press and Forging Hammer. Part II. Laws of Deformation; Applications and Conclusion.) Marcellin Chartron. *Revue de l'Aluminium,* v. 25, April 1948, p. 113-122.

Investigated for light alloys, primarily on the basis of Tresca's law.

19d-33. Stretch Forming Aluminum Sheets. *Iron Age,* v. 161, June 3, 1948, p. 86-87.

Use of Kirksite dies to form aircraft parts formerly made on drop-hammers.

19d-34. Introduction to Aluminum Presswork. Part I. J. W. Lengbridge. *Tool Engineer,* v. 20, June 1948, p. 17-22.

First of a series on the theory and practice of forming aluminum.

19d-35. Spun Glass Prevents Sticking of Magnesium to Stretch-Forming Blocks. *Machinery,* v. 54, July 1948, p. 199.

New technique to facilitate the cold forming of aluminum sheets.

19d-36. Deep Drawing Aluminum. *Machine and Tool Blue Book,* v. 44, July 1948, p. 189-190.

19d-37. Flow of Metal in Drawing Operations. II. J. W. Lengbridge. *Tool Engineer,* v. 21, July 1948, p. 21-24.

Mechanism of flow which occurs during pressing of aluminum. Four characteristics of the flow taking place during forming of a seamless cup. (To be continued.)

19d-38. Aluminum Body Stampings. *SAE Journal,* v. 56, July 1948, p. 27-29. Based on **Aluminum for Body Stampings—Selection of Alloys, Drawings, and Joining,** by J. H. Dunn, E. G. Kort, and G. O. Hoglund. (To be published in full in *SAE Quarterly Transactions.*)

Properties, potential applications, and fabrication techniques for production of automotive-body parts.

19d-39. Spun Glass Aids in Metal Forming. *Aviation Week,* v. 49, July 26, 1948, p.27.

Use of new material, woven into blankets to simplify shaping magnesium sheets which must be worked when hot.

19d-40. Aluminum Goes to Press. Part II. (Concluded.) E. V. Sharpnack. *Tool & Die Journal,* v. 14, Aug. 1948, p. 72-74, 76-77.

Recommended procedures for forming, blanking and piercing, and work-hardening Al sheet.

19d-41. Hot Stretch-Forming of Aluminum Sheets. J. A. Johnson. *Machinery,* v. 54, Aug. 1948, p. 170-171.

Hot forming shows promise of eliminating tears or fractures thus reducing the number of pieces required and the forming operations necessary.

19d-42. Stretch Forming of Magnesium Parts. *Steel,* v. 123, Aug. 9, 1948, p. 94.

Stretch forming of magnesium sheets is aided materially by the use of spun-glass "blankets" to overcome friction between sheet and stretch block. The procedure of forming streamlined structures by stretching a sheet of metal over die forms has proved to be the most efficient way of manufacturing many complicated shapes.

19d-43. Flow of Metal in Rectangular Draws. (Continued). J. W. Lengbridge. *Tool Engineer,* v. 11, Aug. 1948, p. 23-26.

Further discussion of theory and practice of pressing aluminum. Blank development and flow retarding factors. Cause of wrinkles and puckers. (To be continued).

19d-44. Glass "Blanket" for Stretch Forming. Rex Heath. *Tool Engineer,* v. 11, Aug. 1948, p. 58.

Method and application. Uses a

spun-glass sheet between metal and form blocks.

19d-45. Impact Extrusion Methods at Western Aluminum Plant. Harry Pierce. *Light Metal Age,* v. 6, Aug. 1948, p. 20, 22.

19d-46. Developments in the Deep-Drawing of Magnesium. *Magazine of Magnesium,* Aug. 1948, p. 5.

19d-47. Forging Aluminum Alloys. M. Chartron. *Metal Industry,* v. 73, Aug. 6, 1948, p. 107-110, 113; Aug. 13, 1948, p. 131-133; Aug. 20, 1948, p. 149-150. Translated from *Revue d'Aluminium.*

Results of an investigation, and fundamental factors involved.

19d-48. Flow Control by Blankholder Pressure. J. W. Lengbridge. *Tool Engineer,* v. 21, Sept. 1948, p. 23-26.

Installment No. 4 of a series on the theory and practice of pressing aluminum.

19d-49. Magnesium Parts May Be Hot-Formed From Sheet to Produce Deep Draws Economically in One Operation. *Machine Design,* v. 20, Sept. 1948, p. 143-146.

Procedures.

19d-50. "Pre-Stretches"—Forms. *Steel,* v. 123, Sept. 20, 1948, p. 102.

New machines for stretching and forming Al-alloy sheets.

19d-51. Aluminum for Body-Stampings—Selection of Alloys, Drawing, and Welding. J. H. Dunn, E. G. Kort, and G. O. Hoglund. *SAE Quarterly Transactions,* v. 2, July 1948, p. 497-506.

Previously abstracted from condensed version in *SAE Journal,* v. 56, July 1948, p. 27-29. See item 19d-38, 1948,

19d-52. Cold Working of Aluminum at Low Temperatures. T. S. Hutchison. *Nature,* v. 162, Sept. 4, 1948, p. 374-375.

Experiments show that although the metal is spontaneously self-recovering during cold working at room temperatures, it shows lattice-distortion effects if the deformation is carried out at the temperature of liquid air and the specimen is maintained at that temperature.

19d-53. Reduction Factors in Drawing Operations. J. W. Lengbridge. *Tool Engineer,* v. 21, Oct. 1948, p. 23-26.

Installment No. 5 of a series on the theory and practice of pressing aluminum. (To be continued.)

19d-54. Fabricating Curved Parts in Lighter Metals. Cyril J. Bath. *Modern Metals,* v. 4, Oct. 1948, p. 14-16.

Contour forming of light-metal extrusions, rolled shapes, or sheet. Typical civilian and military uses.

19d-55. Spun Glass Blankets for Press Stretching. *Aircraft Engineering,* v. 20, Oct. 1948, p. 315.

New technique developed to overcome difficulties in the hot forming of magnesium sheets.

19d-56. Work-Hardening Under Complex Stresses. K. H. Swainger. *Nature,* v. 162, Oct. 2, 1948, p. 532-533.

Plane stress yielding was induced in a duralumin plate by expanding a 12-segmented cylindrical collet. The tangential strains in the plate were measured at ten values of radius by means of single-filament Minalpha resistance-wire strain gages. At all loads, measured strains in the unyielded portion fitted the theoretical solution exactly.

19d-57. Leichtmetallschmieden auf der Waagerecht-Schmiedemaschine. (Forging Light Metal on the Horizontal "Forging Machine",) B. Preuss. *Metall,* Feb. 1948, p. 45-47.

Methods and equipment. Comparative cost analysis shows the economy of the new method.

19d-58. Redrawing Operations on Circular and Rectangular Shells. J. W. Lengbridge. *Tool Engineer,* v. 21, Nov. 1948, p. 27-30. (Installment No. 6 of a Series on the Theory and Practice of Pressing Aluminum.)

Details as obtained on redrawing 2S and 3S aluminum.

19d-59. New Applications Found for Aluminum Extrusions. F. W. Boynton. *Steel,* v. 123, Nov. 15, 1948, p. 92-94.

Production techniques, the wide variety of shapes now available, and some of the new applications thus made possible.

19d-60. Fifty-Ton Stretch. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 112-113.

New machine designed to stretch-form aluminum sheet stock in sizes up to 42 in. wide by 12 ft. long.

19d-61. Hot Forming Magnesium Sheet. E. F. Stoner and Crosby Harden. *Iron Age,* v. 162, Nov. 18, 1948. p. 109-112.

Results of investigations of various methods, with particular emphasis on forming limitations, methods of heating, and heat ranges. Chief conclusion reported is that hot drop hammering and stretch press forming offer distinct production advantages.

19d-62. Europe Tools for Extrusion. John Everhart. *American Machinist,* v. 92, Dec. 2, 1948, p. 67-69.

Tools for the extrusion of aluminum cans. Commercial methods used abroad.

19d-63. High Speed Photos Reveal Extrusion Rate Phenomenon. R. M. Phill-

ips. *Iron Age,* v. 162, Dec. 2, 1948, p. 102-103.

Reveal a nonuniform slowing of the extrusion rate. Describes the phenomenon and suggests that it is due to elastic effects in the press operating in conjunction with the expected harmonic motion imparted by the crank.

19d-64. Electrification of a Hot Rolling Mill. *Light Metals,* v. 11, Nov. 1948, p. 604-608.

Equipment installed by General Electric Co., Ltd., with particular reference to the special requirements of hot rolling mills for light alloys.

19d-65. Electro-Hydraulic Controls Combined in Stretch Forming Machine. J. A. Helget. *Electrical Manufacturing,* v. 42, Dec. 1948, p. 86-89, 188.

How three independent motor-driven hydraulic systems, governed by push buttons, interlocking relays, solenoid and manual valves, produce directionally controlled tension in aluminum sheet, then wrap it around a forming die.

19d-66. Extruded Aluminum Propeller Blades and Hub. Walter H. Korff. *Product Engineering,* v. 19, Dec. 1948, p. 127.

Described and illustrated. Cost advantages.

19d-67. 60,000-Ton Forging Press Would Revolutionize Aircraft Manufacture. *Steel,* v. 123, Dec. 13, 1948, p. 112.

The largest press in the U. S. has a capacity of 18,000 tons. The Germans had a 30,000-ton press used in an attempt to obtain maximum tensile properties from Mg and Al-alloy ingots. The possible construction of a 60,000-ton press. Potential cost and time savings.

19d-68. Hot-Pressing and Hot-Forging Light Alloys. M. Chartron. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 397-398. Translated and condensed from *Revue de l'Aluminium,* v. 25, No. 141 and 143, p. 37-43; 113-122.

Previously abstracted from original source. (To be continued.) See items 19d-21 and 19d-32, 1948.

19d-69. Uber den Presseffekt der Aluminium-Zink-Magnesium-Legierung Hy 43 mit 4,5% Zn und 3,5% Mg. (The Effect of Working on the Aluminum-Zinc-Magnesium Alloy "Hy 43" Containing 4.5% Zn and 3.5% Mg.) Gustav Siebel. *Metallforschung,* v. 2, Nov. 1947, p. 331-340.

The effects of Cu, Mn, Cr, Ti, and V; of reduction in area; and of temperature and time of annealing on the strength properties of drawn Hy 43 wires.

19d-70. Zur Frage des Werkstoffes und seiner Eigenschaften beim Fliesspressen von Leichtmetallen. (The Problem of the Material and Its Properties in the Extrusion of Light Metals.) Hermann A. J. Stelljes. *Metallforschung,* v. 2, Nov. 1947, p. 341-348.

The effects of extrusion on grain sizes and mechanical properties of pure aluminum and Al alloys.

SECTION XX

MACHINING

20a—General

20a-1. Feet for Jigs and Fixtures. W. H. Litten. *Machinery* (London), v. 71, Nov. 13, 1947, p. 545-546.

Examples of stable and unstable designs.

20a-2. An Interlock Guard for Milling Machines. *Engineer*, v. 184, Nov. 14, 1947, p. 461.

20a-3. Auto-Collimator and Its Applications. *Machinery* (London), v. 71, Nov. 20, 1947, p. 568-570.

Instrument designed to measure small angular deflections to a fraction of a second of arc and its applications in machine-shop practice.

20a-4. Mechanism for Stopping Press When Stock Feed Fails. *Machinery* (London), v. 71, Nov. 20, 1947, p. 571-572.

20a-5. Automatic Hydraulic Knurling Fixture. *Machinery* (London), v. 71, Nov. 27, 1947, p. 598-599.

Shafts with diameters from ½ up to 1 in. can be knurled at the rate of 510 per hr. by means of the unit illustrated.

20a-6. Adjustable Boring Fixture for Machining Fillets to Different Radii. *Machinery* (London), v. 71, Nov. 27, 1947, p. 599.

Smoothly finished fillets or corners can be turned to different radii on the outer or inner diameters of cylindrical parts by means of the fixtures described.

20a-7. The Production of Small Worm Gears for Experimental Work. A. M. Gunner. *Institution of Mechanical Engineers Proceedings*, v. 156, Dec. 1947, p. 368-372.

Methods used for production of one or two each of an endless variety of worm gears for use in a research laboratory. The gears are designed as hollow-faced helical gears, and all calculations are based on the normal pitch in order to enable standard hobs and cutters to be used for the worms.

20a-8. Manufacture of Diamond Tools and Their Application in Germany. *Industrial Diamond Review*, v. 7, Nov. 1947, p. 334-342. Reprinted from B.I.O.S. Report No. 1448, "The German Industrial Diamond Industry", by G. J. Trapp and others.

31 references. (To be continued.)

20a-9. A Handbook of Vertical Surface-Broaching Fixtures. Part I. Ben C. Brosheer. *American Machinist*, v. 92, Jan. 1, 1948, p. 77-92.

Stationary, trunnion, index, and universal fixtures. (To be continued.)

20a-10. Practical Ideas. *American Machinist*, v. 92, Jan. 1, 1948, p. 103-108.

Use of holders for toolmaker's buttons to solve difficult layout problems (Frederico Strasser); air cylinder for automatic tandem loading of presses (Joseph F. Budnick); open-side toolholders for close facing and turning (Arthur Morton); rubber jaws for holding several pieces of round stock at the same time (A. F. Scoblic); telescoping vise insert to hold sheet metal flat while polishing or filing (C. D. Mackinnon); use of indexing table to mill 6-hex heads in three passes (Robert Mawson); and other miscellaneous shop hints.

20a-11. Cams—Their Production and Application. John E. Hyler. *Machine and Tool Blue Book*, v. 44, Jan. 1948, p. 131-136, 138-139.

First of a series. (To be continued.)

20a-12. Accurate Machining of External and Internal Straight-Sided Splines. Douglas T. Hamilton. *Machine and Tool Blue Book*, v. 44, Jan. 1948, p. 149-152, 154-155.

A forming process can be used to produce straight-side splines without leaving a fillet at the bottom of the spline. Equipment necessary and method of application. Types of cutters used for external splines; methods of aligning cutter with the work.

20a-13. Work Clamps, Supports and Fastenings for Use With Drill Jigs. C. W. Hinman. *Machine and Tool Blue Book,* v. 44, Jan. 1948, p. 168, 170, 172, 174, 176, 178, 180, 182, 184.

Some of the fastening devices used with drill jigs.

20a-14. Machining. *Steel,* v. 122, Jan. 5, 1948, p. 287-317.

Brief reports on various new developments: Ingenuity of Machine Tool Builders Revealed at Show, by George H. Johnson; Push-Button Control Makes for High Quality Workmanship, by Louis Polk; Predicts Era of Technical Changes in Manufacturing, by Frederick V. Geier; Carbide Tool Design Aided by Mechanical Holder, by Philip M. McKenna; Trend to Reduced Handling Time Instead of Reduced Speed, by Charles J. Stilwell; Good Housekeeping, Efficiency Aim of New Machine Designs, by F. J. Lapointe; Sees End of Rule-of-Thumb Machine Tool Design Methods, by R. J. Johnson; Carbides Not Limited to Nonpercussive Applications, by W. G. Robbins; Trend Toward Greater Use of Carbide Tools Noted, by R. R. Weddell; Mechanical Hob Shift Promotes Precision in Hobbing Techniques, by Ralph L. Cotta; Idle Time Must Be Studied to Achieve Cost Reduction, by O. L. Bard; First Postwar Advancement in Over-All Design Noted, by H. B. Newton; Newly Designed Lathes Powered for Carbides, by W. J. Grimm; Automatic Equipment Points Way to Reduced Labor Costs, by J. G. Johnston; Modern Machinery Urgent Economic Necessity, by J. Y. Scott; Circuit Breakers Provide Manual Disconnect on Machine Tools, by L. W. Herchenroeder; Machine Tool Users More Speed-Conscious Than Ever Before, by William L. Dolle; 1947 Seen as Outstanding Year in Art of Cutting Metal, by A. C. Bryant; Diesetting Now Easy as Cranking Table of Miller, by R. F. Moore; Improvements in Hydraulic Systems Provide Longer Service, by Silas T. Massey; Multiple Spindle Automatics Permit Less Work Handling, by H. P. Chaplin; Largest Diameter Brass Rod Available for Fabricators, by M. J. Mianulli; Rising Costs Demand Better Processing and Handling, by J. R. Weaver; Carbides Speed, Increase Accuracy of Many Machines, by C. R. Harmon; Definite Trend to Automatic Sizing and Truing Sensed, by C. D. Day; Sees Increased Demand for New Broaching Equipment, by Harry Gotberg; Tools Must Be Designed Right, Made Right for Specific Use, by S. B. Hellstrom; Further Gains in Automaticity Seen Through Use of Electronics, by E. P. Blanchard; New Machines Different From Prewar Prototypes, by Tell Berna; Trend to Single-Station Units Served by Automatic Loading, by W. S. Praeg; "Customer Education" Important in Proper Use of Carbides, by K. R. Beardslee; Tool Engineer Seen as Industrial Statesman, by Harry E. Conrad; Careful Analysis Required in Selecting Presses, by George Habicht, Jr.; Better Equipment, Sales Methods Twin Keys to Inflation Problem, by Frederick S. Blackall, Jr.; Tool Engineer Must Guide Progress of Productivity, by Otto W. Winter; Lowering of Operating Costs to Require Bold Top Decisions, by K. W. Connor; Improved Machine Tool Design Offers Increased Production, by J. K. Fulks; Machine Tool Industry Is Not Designing Self Out of Business, by B. N. Brockman; Tracer-Controlled Cutting Tool Aids Templet Work Duplication, by Alfred Kullman; Sees Automatic Equipment Opening New Industrial Era, by E. E. Butler.

20a-15. Truing Profiled Grinding Wheels. P. Grodzinski. *Machinery* (London), v. 71, Dec. 4, 1947, p. 624-627.

Analyzes mathematically the method using a universal diamond truing device. Other possible methods.

20a-16. Tool Geometry of Face Milling Cutters. M. Kronenberg. *Machinery* (London), v. 71, Dec. 4, 1947, p. 628-630.

To facilitate demonstration and study of the problems involved the Cincinnati Milling Machine Co. prepared a transparent plastic model of a typical face-milling cutter. Three different aspects are illustrated: angular relationships, chip flow, and initial contact of tooth and workpiece. Chart for determining true rake and inclination of face-milling cutter teeth.

20a-17. Machine Vise Adapter for Angular Workpieces. *Machinery* (London), v. 71, Dec. 4, 1947, p. 632-633.

20a-18. A Vertical Indexing Chucking Fixture. *Machinery* (London), v. 71, Dec. 4, 1947, p. 633.

20a-19. C. P. Shops Are Completely Equipped. Howard Campbell. *Modern Machine Shop,* v. 20, Jan. 1948, p. 124-130, 132, 134, 136.

Shop equipment for maintenance of rolling stock of the Canadian Pacific Railway at Montreal.

20a-20. Ideas From Readers. *Modern Machine Shop,* v. 20, Jan. 1948, p. 200, 202, 204, 206, 208, 210, 212, 214, 216.

A Useful Drilling Jig for Uneven Workpieces, by Robert Mawson; Blocked-Up Press Column Provides More Space for Drilling Operations, by Walter Rudolph; Device for Centering Milling Machine Cutters, by D. E. McDonald; Tool Post Wire Guide, by Bert Charlesworth.

20a-21. Gear Cutting Equipment Found Applicable for Uses Outside Its Original Field. *Steel,* v. 122, Jan. 12, 1948, p. 86, 89.

Many uses outside the gear field include splines, cams, sprockets, ratchets, toothed parts, sliding clutches, and special forms. A few typical parts are diagrammed along with the tool shapes used to cut them.

20a-22. Wandering Sequence Control for Multiple-Spindle Honing Machine. J. E. Kline. *Electrical Manufacturing,* v. 41, Jan. 1948, p. 116-119, 182.

Measured acceleration, deceleration, and inertia of the rotor are used to calculate the torque developed.

20a-23. Align Honing Eliminates Bearing Scraping. H. E. Linsley. *American Machinist,* v. 92, Jan. 15, 1948, p. 88-89.

Recent development known as align honing makes possible finish honing of two bearings in line to extremely close limits of size, roundness, taper, and alignment.

20a-24. Tool Angles Govern Cutting Efficiency. M. Kronenberg. *American Machinist,* v. 92, Jan. 15, 1948, p. 90-92.

Previously abstracted from *Machinery* (London). See item 20a-16.

20a-25. A Handbook of Vertical Surface-Broaching Fixtures. Part II. Ben C. Brosheer. *American Machinist,* v. 92, Jan. 15, 1948, p. 101-116.

Various types of shuttle fixtures: those with hand-operated clamps; with mechanical clamps; and with air and hydraulic clamps. (See also 20a-9.)

20a-26. Practical Ideas. *American Machinist,* v. 92, Jan. 1, 1948, p. 119-124.

Spherical-turning lathe tool for cutting precision ball-and-socket elements (Allen B. Nixon); indicator for setting rough and finished shaft diameters (T. H. Hanley); steel balls as centers to improve offset tailstock taper turning (A. F. Wyleta); special gages for counterbore-to-end distance, pilot depth, and simultaneous gaging of hole depth and neck length (F. Hartley); centering device to locate keyways on tapered shafts (W. M. Halliday); and other miscellaneous shop hints.

20a-27. Automatic Milling Machine Guard. *Machinery* (London), v. 71, Dec. 11, 1947, p. 663.

Guard designed and patented in England is shown attached to a Cincinnati Milling machine.

20a-28. Manufacture of Diamond Tools and Their Application in Germany. (Continued.) *Industrial Diamond Review,* v. 7, Dec. 1947, p. 354-363.

Application of truing tools; glass cutters; stone sawing and rock drilling; and diamond drawing dies. 15 ref. (To be continued.)

20a-29. The Basic Principles of Grinding Hard Materials. (Continued.) Ph. Kruel. *Industrial Diamond Review,* v. 7, Dec. 1947, p. 367-371. Translated from "Grundlogende Erkentnisse Veber das Schleifen von Hartstoffen, Heft 3—Forschugnsarbeiten aus dem Gebiet Schleifen und Polieren".

Metallic wheel bodies with pressed-in diamond grains; influence of amount of lubrication; grinding of sintered carbides. Appendix on determination of optimum grain size for minimum working time.

20a-30. Diamond Wheels, Their Manufacture and Use. T. D. Meyer. *Industrial Diamond Review,* v. 7, Dec. 1947, p. 372-374. Condensed from *Australasian Engineer,* Jan. 7, 1947, p. 52-56.

20a-31. Safety Attachment for Power Saws. Reginald J. Gilson. *Machinery,* v. 54, Jan. 1948, p. 154.

20a-32. Method of Eliminating Play on a Worn Lathe. *Machinery,* v. 54, Jan. 1948, p. 157.

With this setup, the inside diameter of aircraft parts is bored to within a total tolerance of 0.0003 in.

20a-33. Selecting the Right Size of Grinding Wheel. John F. Fischer. *Machinery,* v. 54, Jan. 1948, p. 162-163.

Recommended procedure.

20a-34. Fixtures That Increase Production in Parallel-Surface Grinding. R. D. Gardner. *Machinery,* v. 54, Jan. 1948, p. 176-179.

Rotary-type carriers, "feed-through" fixtures, and hydraulically oscillated sliding tables have greatly increased the fields of application and production of double-spindle grinders.

20a-35. Ingenious Mechanisms. *Machinery,* v. 54, Jan. 1948, p. 187-188.

Vise Operated by a Rack and Pinion With Locking Motion, by L. Kasper; Determining the Face Width of Spline Cutters, by Herman A. Neff.

20a-36. Adapting a Lathe for Turning Special Dowel-Pins. Donald A. Baker. *Machinery,* v. 54, Jan. 1948, p. 189-190.

20a-37. Lathe Adapted to Produce Calibrated Fuel-Injection Nozzles. *Machinery,* v. 54, Jan. 1948, p. 193.

System for simultaneous calibration and machining of nozzles ranging in diameter from 0.0004 to 0.004 in.

20a-38. Removal of Chips From Jigs. W. H. Litten. *Machinery* (London), v. 71, Dec. 18, 1947, p. 694-697.

Correct and incorrect designs to facilitate the above.

20a-39. The Capillary Drill. *Machinery Lloyd* (Overseas Edition), v. 19, Dec. 20, 1947, p. 102.

British-made machine for drilling

holes down to 0.004 in. in diameter with accuracy.

20a-40. The Locking of Jigs and Fixtures. W. H. Litten. *Machinery* (London), v. 71, Dec. 25, 1947, p. 719-721.

Diagrams show various arrangements for the above.

20a-41. Abrasive Belt Machining for the Toolroom. Harvey L. Ramsay. *Tool & Die Journal,* v. 13, Jan. 1948, p. 56, 58, 78, 80.

20a-42. Combination Grinder-Comparator. *Machine Design,* v. 20, Jan. 1948, p. 149-150.

New machine tool which permits continuous, enlarged comparison of work profiles with "master" drawings while the grinding operation is in progress.

20a-43. Accuracy Improved and Costs Cut on Diverse Operations. Harold York. *Production Engineering & Management,* v. 21, Jan. 1948, p. 51-52.

Use of cemented carbide bars in precision boring of holes having a relative length of eight times the hole diameter.

20a-44. Correcting the Angle for V-Shaped Cutting Tools. Charles L. Hall. *Production Engineering & Management,* v. 21, Jan. 1948, p. 53.

A formula for determining the grinding-wheel dressing angle which will maintain the correct angle on V-shaped cutting tools upon repeated sharpening.

20a-45. Block Line Efficiency Boosted by Improved Machine Tools. *Production Engineering & Management,* v. 21, Jan. 1948, p. 55-61.

Various production operations at Hudson Motor Car Co.

20a-46. Universal Drill Jig. Edward J. Carey. *Production Engineering & Management,* v. 21, Jan. 1948, p. 65.

Drill jig with broad application to drilling and pinning operations on small shafts which have hubs of various size and diameters.

20a-47. The Economics of Broaching. W. A. Carter. *Aircraft Production,* v. 10, Jan. 1948, p. 19-23.

Some practical considerations in the use of surface and internal broaching as a production process. (To be continued.)

20a-48. Milling With the Slotting Attachment. Lawrence O. Dirk. *Screw Machine Engineering,* v. 9, Jan. 1948, p. 38-42.

20a-49. Screw Machine Engineering Data Sheet; Circular Forming Tool Holders. *Screw Machine Engineering,* v. 9, Jan. 1948, p.53.

Dimensions tabulated.

20a-50. Gage for Measuring Milling Cutter Angles. B. A. Kurenkov. *Engineers' Digest* (American Edition), v. 4, Dec. 1947, p. 588-589. Translated and abstracted from *Stanki i Instrument,* 1947, p. 18.

20a-51. American Machinist 35th Annual Review of Metalworking Equipment. *American Machinist,* v. 92, Jan. 29, 1948, p. 127-294.

More than 1500 new products of interest to the metalworking industries.

20a-52. Wheels for Grinding Tools—Broaches, Cutters, Reamers and Taps. *American Machinist,* v. 92, Jan. 29, 1948, p. 297.

Tables of standard sizes and bonds.

20a-53. Use Classification for Grinding Wheels. *American Machinist,* v. 92, Jan. 29, 1948, p. 299.

Standard shapes are diagrammed and numbered. Basic uses are listed with applicable wheel numbers alongside.

20a-54. Accurate Drilling Without a Jig. Charles E. Lambert.*Tool Engineer,* v. 19, Jan. 1948, p. 30.

Simple tool devised for large-scale production of balance wheels.

20a-55. Centering Tool for Milling Cutters. D. E. McDonald. *Tool Engineer,* v. 19, Jan. 1948, p. 36.

Centering and offsets are quickly accomplished by means of simple device.

20a-56. Development of Economical Jig Grinding. Watson N. Nordquist. *Tool Engineer,* v. 19 Jan. 1948, p.37-38.

High-speed grinding attachment meets need for accurate conversion tool.

20a-57. Gadgets. *Tool Engineer,* v. 19, Jan. 1948, p. 42.

Drill Jig for Hex Tube, by Robert Mawson; Self-Aligning Back Rest, by Edmund L. Johnson.

20a-58. Compressed Air—the Great Equalizer. Vaners Borg. *Tool Engineer,* v. 19, Jan. 1948, p. 43-44.

Use of air tools in the small shop.

20a-59. Mechanism for Controlling Cutter-Head Slide of Cam-Generating Device. *Machinery* (London), v. 72, Jan. 1, 1948, p. 16-17.

20a-60. Grooving Tool for Oil Pump Body. *Machinery* (London), v. 72, Jan. 1, 1948, p. 17.

20a-61. Toolholder for Boring Bar. *Machinery* (London), v. 72, Jan. 1, 1948, p. 18-19. Translated from *Werkstatt & Betrieb,* v. 80, March 1947, p. 85-86.

20a-62. Hydraulic Control Mechanism for Profile Milling Machine. *Machinery* (London), v. 72, Jan. 8, 1948, p. 46-47. Based on F.I.A.T. Final Report No. 628.

Mechanism by which it is possible to obtain universal motion in 3 dimensions, enabling complicated internal and external forms to be reproduced to an accuracy of 0.0002 in.

20a-63. Accuracy and Diverse Operations Improved by Precision Boring With Rigid Solid Carbide Bars. *Steel*, v. 122, Feb. 9, 1948, p. 100.

20a-64. Machine Tools at Riverside. Gordon B. Ashmead. *Western Machinery and Steel World*, v. 39, Jan. 1948, p. 66-69, 98-100.

Procedures and equipment used at Food Machinery Corp., Riverside, Calif.

20a-65. West Tools Far East. *Western Machinery and Steel World*, v. 39, Jan. 1948, p. 78-80.

Machinery operation in production of large machinery for cement plants on the island of Taiwan.

20a-66. Grades of Carbides and Their Applications to Milling. *Western Machinery and Steel World*, v. 39, Jan. 1948, p. 82-84. Condensed from **Milling with Carbides,** a publication of the Milling Cutter Division of the Metal Cutting Tool Institute.

20a-67. You Can Use Cemented Carbide Tools Successfully. *Western Machinery and Steel World*, v. 39, Jan. 1948, p. 96, 110.

First of a series describing properties and applications.

20a-68. The Design and Construction of a 14-Ft. Gear Hobbing Machine. B. Barback. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 9-14. Condensed from paper No. 1091 of *Institution of Engineers and Shipbuilders in Scotland*, Oct. 1947, 31 pages.

20a-69. "Balanced" Production at Detroit Gear. Bartlett West. *Modern Machine Shop*, v. 20, Feb. 1948, p. 154-156, 158, 160, 162, 164, 166.

Shear-Speed hobbing and gear shaping; rack and underpress finishing methods at Detroit Gear Division of Borg-Warner Corp. which enable manufacturer to increase production on gears for truck transmission.

20a-70. Device for Checking Single Point Threading Tools. D. E. McDonald. *Modern Machine Shop*, v. 20, Feb. 1948, p. 180.

Use in checking the angle of tools.

20a-71. Adjustable Spindle Stop. Bert Charlesworth. *Modern Machine Shop*, v. 20, Feb. 1948, p. 184, 189.

Tool designed for facing-off ends of shafts to uniform accurate lengths.

20a-72. Milling Cams Without a Master or Layout. *Machinery*, v. 54, Feb. 1948, p. 178-179.

Disk cams for use on Brown & Sharpe No. 00, 0, and 2 automatic screw machines can be quickly and economically cut from special cast iron or mild steel blanks by means of the milling-machine attachment.

20a-73. Tool Engineering Ideas. *Machinery*, v. 54, Feb. 1948, p. 183-186.

Magnetic Holding Fixture Speeds Assembly Operation, by Herbert Weitz; Lathe Attachment for Chamfering Both Ends of Cylindrical Parts, by Mark W. Purser; and Indexing Fixture for Use in Machining Aluminum Containers, by Donald A. Baker.

20a-74. Cams; Their Production and Application. John E. Hyler. *Machine and Tool Blue Book*, v. 44, Feb. 1948, p. 143-146, 148, 150, 152.

Machine tools and methods.

20a-75. Generating Regular and Irregular Holes With a Gear Shaper. Douglas T. Hamilton. *Machine and Tool Blue Book*, v. 44, Feb. 1948, p. 155-156, 158, 160, 162, 164.

20a-76. How to Turn Nonstandard Threads. Ernest L. Schlage. *American Machinist*, v. 92, Feb. 12, 1948, p. 95.

20a-77. Shop Shots at Friden. *American Machinist*, v. 92, Feb. 12, 1948, p. 98-99.

Bevel-gear cutting, machining oscillating cams, multipress broaching, hypermilling carriage rails, grinding dials, and keytop painting.

20a-78. Practical Ideas. *American Machinist*, v. 92, Feb. 12, 1948, p. 129-134.

Offset boring head for taper turning with lathe (J. W. Rundt); tool for burring small inaccessible holes (Robert J. Chrosniak); fixture for spherical holes used as ball-and-socket joints (Clifford T. Bower); quick method for calculating gear changes not listed on gearbox plate (Wilton F. Hoag); gashing and hobbing of worn gears on engine lathe (Neil MacLeod); checking rotary table of surface grinder by use of two thin bars (S. Framurz); shaft-positioning device (H. Moore); cutting grooves in blind bore with special lathe tool (Allen MacNeal); and other miscellaneous shop hints.

20a-79. Methods for Mounting Cutters. *American Machinist,* v. 92, Feb. 12, 1948, p. 147.

20a-80. Job Planning on the Turret Lathe. Part I. E. L. Murray. *Tool Engineer,* v. 20, Feb. 1948, p. 17-25.

Fundamentals of turret-lathe practice; tooling principles; importance of the time element; scheduling of prior and succeeding operations; workholding devices; holding devices for second operations; barstock holding devices; maintaining close tolerances; principles of machining holes; special vs. standard tooling; production estimating; use of tables of machining rates; relations of available power. (To be concluded.)

20a-81. New Pantograph Simplifies Duplicating. Gunnar Skog. *Tool Engineer,* v. 20, Feb. 1948, p. 26.

New machine is said to feature the first basic improvement since 1825. This improvement is the Ratiobar, a device which, supported at either end by a rugged, yet delicately balanced, over-arm, aligns the pivot center, cutter spindle, and tracing stylus in an absolutely straight line. Another feature is that there is only one slider block to adjust for whatever reduction ratio is desired.

20a-82. Brown & Sharpe Introduces New Automatic. Karl Stad. *Tool Engineer,* v. 19, Jan. 1948, p. 44.

20a-83. A New Approach to the Problem of Automatic Size Control. Raymond T. Fenn. *Electrical Manufacturing,* v. 41, Feb. 1948, p. 106-110, 178, 180.

For either automatic diamond or plug sizing in an internal grinder, integrated control relays tie in rough and finish rates of hydraulic-wheel reciprocation with four motorized cross-feed rates, preselected through a novel system of variable-voltage control.

20a-84. Clearance Table for Cutter Grinding. *Production Engineering & Management,* v. 21, Feb. 1948, p. 73.

20a-85. The Economics of Broaching. Part II. Chip Control; Work Materials; Broach Assemblies; Fixtures. W. A. Carter. *Aircraft Production,* v. 10, Feb. 1948, p. 62-64.

20a-86. Adjustable Edge-Drilling Jig. H. Moore. *Machinery* (London), v. 72, Jan. 22, 1948, p. 120.

Jig for drilling holes in the edges of flat metal plate.

20a-87. The Works of Jones & Shipman, Ltd. *Machinery* (London), v. 72, Jan. 29, 1948, p. 135-139.

Machining and finishing equipment and procedures of British factory for manufacture of machine and hand tools.

20a-88. Machine Filing. A. G. Arend. *Machinery* (London), v. 72, Jan. 29, 1948, p. 145.

Use of endless-band type of filing machine in preference to the reciprocating type.

20a-89. The Evaluation of Cutting Fluids in Laboratory Equipment. L. H. Sudholz. *Lubrication Engineering,* v. 4, Feb. 1948, p. 18-24.

The theory of metal cutting and details of evaluation methods, both physical and chemical. Typical cutting fluid types.

20a-90. Single Point Boring Tools—Vibration Versus Precision. A. W. Ehlers. *Industrial Diamond Review,* v. 8, Feb. 1948, p. 46-47. Condensed from *Tool & Die Journal,* v. 12, Feb. 1947, p. 68-70.

Previously abstracted from original paper. See item 20-93, R.M.L., v. 4, 1947.

20a-91. Production Processes — Their Influence on Design. Part XXXI—Automatic and Shape Turning. Roger W. Bolz. *Machine Design,* v. 20, Feb. 1948, p. 129-134.

20a-92. Tables for Step Corrections on 5° Top Rake Circular Tools for Brown & Sharpe Automatics. Roy M. Spaulding. *Screw Machine Engineering,* v. 9, Feb. 1948, p. 42-46.

Includes also a description of their use.

20a-93. Diamond Truing Without Interrupting Grinding Cycle. *Industrial Diamond Review,* v. 8, Feb. 1948, p. 54.

20a-94. Tool Design in Calculator Production. William B. Nonamaker. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 82-85, 116-117, 122.

Procedures and equipment used at Friden Calculating Machine Co.

20a-95. Solid Carbide Boring Bars. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 104-105.

Properties, design, and applications.

20a-96. You Can Use Cemented Carbide Tools Successfully. J. W. Suley. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 106.

Practical principles of their use.

20a-97. Operating Techniques for Carbide Milling. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 109-114, 122.

Condensed from "Milling with Carbides," Milling Cutter Division, Metal Cutting Tool Institute.

20a-98. Tooling for Wineries. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 115.
Production of miscellaneous wine-making machinery.

20a-99. Broaching on the Automatic Screw Machine. C. H. Wummel. *Screw Machine Engineering,* v. 9, Feb. 1948, p. 25-27.
Illustrated by use of a typical example.

20a-100. Profit by Advanced Engineering. J. T. Vinbury. *Screw Machine Engineering,* v. 9, Feb. 1948, p. 30-33.
Details of tooling for production of part in 5.87 sec. on a New Britain, 6-spindle, automatic screw machine, Model 601. Previous method required a brass casting and individual operations for each machining operation.

20a-101. Complex Bending Operations Performed on the Automatic Screw Machine. C. H. Wummel. *Screw Machine Engineering,* v. 9, Feb. 1948, p. 36-37, 40-41.
Method whereby two complex double-bending jobs are completed on the automatic screw machine by combined movements of the vertical turret and cross slides. A Brown & Sharpe machine equipped with a spindle brake is used.

20a-102. Stock Ends. *Screw Machine Engineering,* v. 9, Feb. 1948, p. 49.
Increased Threading Capacity (of No. 2 B. & S. Automatics to 1½-In. Diam.) by John Ozga; Turret Tool Stop, by E. J. Rondeau; and Burring Parts, by J. Harrow.

20a-103. Screw Machine Engineering Data Sheet; Dovetailed Forming Tool Holders. *Screw Machine Enaineering,* v. 9, Feb. 1948, p. 55. Reprinted from American Standard, Circular and Dovetailed Forming Tool Blanks, B5, 7-1943, American Standards Association, 70 E. 45th St., New York.
Diagrammed and dimensions tabulated.

20a-104. Precipitating Oil Coolant Mist Electrostatically. *Steel,* v. 122, Feb. 23, 1948, p. 86-87, 115.
How removal at its source of mist generated by high-speed machining operations improves working conditions and eliminates a fire hazard.

20a-105. Contour Sawing Hardened Steels and Carbides. *Iron Age,* v. 161, Feb. 26, 1948, p. 73.
Diamond band saw for cutting tungsten carbides and hardened steel, as well as stone and vitreous materials, to a layout line with precision comparable to that of conventional contour sawing.

20a-106. Use of Single-Tool Boring Tools. *American Machinist,* v. 92, Feb. 26, 1948, p. 133, 135, 137.

20a-107. Practical Ideas. *American Machinist,* v. 92, Feb. 26, 1948, p. 117-122.
Fly cutters set progressively for even distribution of cutting load (George C. Allen); toolholder block with cutting-oil holes to speed cutoff (John J. Moffatt); internal collet grips turnings for close concentric machining (George W. Brown); templet and follower fixture for turning of spheroids (F. G. Fonquen); quick-acting fixture for jig closing (H. Moore); spindle stop converts engine lathe into cutoff machine (Allen B. Nixon); and other miscellaneous shop hints.

20a-108. Rings, Pistons and Liners. *Automobile Engineer,* v. 38, Feb. 1948, p. 51-61.
Machine-shop production methods at a British firm. Both light alloys and ferrous materials are used.

20a-109. The Production of High-Speed Oil Engines. *Machinery* (London), v. 72, Feb. 12, 1948, p. 203-210.
Machine-shop operations, assembly, and testing at British firm. Steel and aluminum alloys are used.

20a-110. Cemented Carbide Milling Cutters and Their Application. H. Eckersley. *Machinery* (London), v. 72, Feb. 12, 1948, p. 211-214.
Nomographs for feed rates corresponding to metal-removal capacities, horsepowers, and areas of cut; and for relationships between feed, r.p.m., number of effective teeth, tooth load, cutter diameter, and speeds of cutter periphery. Causes of cutter wear and establishment of operating data.

20a-111. Production Problems Solved by Special Machine Attachments. Gerald Eldridge Stedman. *Production Engineering & Management,* v. 21, March 1948, p. 57-60.
Several ingenious adaptations of standard machine tools to special requirements for long-run operations.

20a-112. Streamlined Production. *Production Engineering & Management,* v. 21, March 1948, p. 62-68.
Use of new machine tools along with an improved arrangement of existing equipment to increase efficiency and boost output of diesel engines.

20a-113. An Indexing Drill Jig for Accuracy and Rapid Loading. Robert Mawson. *Production Engineering & Management,* v. 21, March 1948, p. 69-71.
Basic principles which govern the design of efficient drill jigs are in-

corporated in the development in which the work is held stationary and the bushing plate is indexed.

20a-114. Tooling and Production of the Apex Fold-A-Matic Ironer. Part II. Carl F. Benner. *Tool & Die Journal,* v. 13, March 1948, p. 72-74.

Operations on transmission and gear case, and for milling the bottom face of the housing. (To be continued.)

20a-115. Special Tools for Special Purposes. *Tool & Die Journal,* v. 13, March 1948, p. 86-88.

Describes and illustrates some tools made by National Tool Co., Cleveland, and their applications.

20a-116. Cams—Their Production and Application. John E. Hyler. *Machine and Tool Blue Book,* v. 44, March 1948, p. 199-200, 202, 206, 208, 210, 212, 214.

Use of a profiling machine to trace small cams from a 5×-oversize layout made on plastic sheets, then transferred to a sensitized metal plate which acts as master from which the finished cam is made.

20a-117. Production Processes—Their Influence on Design. Part XXXII—Production Grinding, General Considerations. Roger W. Bolz. *Machine Design,* v. 20, March 1948, p. 135-141.

20a-118. Automatic Cutter Grinder Has Noteworthy Design Features. *Machine Design,* v. 20, March 1948, p. 160-162.

Designed for sharpening face mill cutters, with automatic grinding-wheel dressing for each tooth grind. Powered and cycled hydraulically.

20a-119. Roller Ways in Grinder Cut Table Friction to Minimum. *Machine Design,* v. 20, March 1948, p. 162-163.

New B. & S. machine tool. Blueprint-type diagram.

20a-120. Setups for Grinding Milling Cutters. Freeman C. Duston. *Machinery,* v. 54, March 1948, p. 150-157.

Examples showing procedures in sharpening milling cutters, end-mills, formed cutters, and similar tools. (To be continued.)

20a-121. From Jaquet-Droz's Automatons to Billeter's Universal Machine. Alfred Chapuis and Edmond Droz. *Microtechnic,* v. 1, Dec. 1947, p. 134-137. (For figures see French section, p. 300-307.) Translated from the French.

Details of European-made machine tool which accomplishes many sorts of complicated operations.

20a-122. Automatic Drilling and Tapping Machines. *Die Castings,* v. 6, March 1948, p. 66-68, 70, 73-74.

Describes and illustrates these machines and gives basic operating principles. Setups for several typical production jobs.

20a-123. Job Planning on the Turret Lathe. E. L. Murray. *Tool Engineer,* v. 20, March 1948, p. 33-40.

Typical tool setups for first and second operation work. (Concluded.)

20a-124. An Old Friend in the "New Look". Karl Stad. *Tool Engineer,* v. 20, March 1948, p. 50.

Fixtures for holding round parts from turning against heavy drill torque.

20a-125. How to Gun-Drill for Fine Finish. James Harris. *American Machinist,* v. 92, March 11, 1948, p. 136-139.

Use of carbide-tipped gun drills to achieve tolerances within a few ten-thousandths of the nominal hole diameter and finishes of 3 to 4 micro-inches on aluminum alloys and 4 micro-inches on cast iron, with an average of 7 to 7½ in production. Also time required for gun drilling of a multiple-step hole has reduced time required from 15 to 1½ min., and less skilled personnel are required.

20a-126. Precision Taps Flute-Sharpened for Close Tolerances. Stanley Lovejoy. *American Machinist,* v. 92, March 11, 1948, p. 133-135.

During the war much difficulty was encountered at General Electric in getting a reasonable amount of production from purchased taps for class three tolerance in the small fine-thread series sizes 0 to ¼ in. A study of the taps showed that they were well within specified tolerances for pitch diameter, outside diameter, lead, and chamfer angle. However, the shapes, sizes, and hook angles of the flutes varied greatly. This led to adoption of flute grinding for correct rakes. Development of a satisfactory procedure for the latter.

20a-127. Work Loaders Applied to Machine Tools. Rupert Le Grand. *American Machinist,* v. 92, March 11, 1948, p. 149-172.

Special report on a wide variety of applications, including boring, broaching, gear-cutting, grinding, honing, milling, threading, and turning machines.

20a-128. Practical Ideas. *American Machinist,* v. 92, March 11, 1948, p. 183-188.

Grinder mounted on shaper ram sharpens teeth of circular saw (John T. Zurlo); diagrams of four types of stud removers for close quarters (R. E. Trospect); production of 7-ft., 6-in. rack, in sections to be joined later, by use of shaper (U. Wheatley); points out difference in tool-point widths for production of a

worm thread on mill and lathe, respectively (Edward J. Rantsch); use of adjustable steadyrest to eliminate taper in cylindrical-ground work (Allen B. Nixon); and other miscellaneous shop hints.

20a-129. Uses for Double-End Tool Boring. *American Machinist,* v. 92, March 11, 1948, p. 199, 201.

Various applications.

20a-130. Modern Cutting Tools and Machine Tool Design. C. Eatough. *Engineer,* v. 185, Jan. 9, 1948, p. 53; discussion, p. 52; Jan. 16, 1948, p. 75-77. Condensed from paper presented to Institution of Mechanical Engineers, Jan. 2, 1948.

Machine tool design and effects of differences in cutting tool shapes and dimensions on cutting speeds.

20a-131. Adjustable Flat Boring Cutters. G. R. Milner. *Machinery* (London), v. 72, Feb. 26, 1948, p. 276.

A double-cutting, edge-type flat tool was developed for finish boring long holes of 3½ in. diameter in steel castings, using a horizontal boring machine. The tool is provided with cemented carbide tips which are brazed onto a soft steel body.

20a-132. Hydraulic Operation for a Five Station Production Machine. *Applied Hydraulics,* v. 1, Feb. 1948, p. 24-25.

A high-production, special-processing machine into which are incorporated self-contained hydraulic systems in each of five stations, a motor-driven hydraulic unit for indexing, and a circuit for locking the machine table. The machine drills, reams, and counterbores Kaiser-Frazer engine connecting rods and caps.

20a-133. You Can Use Cemented Carbide Tools Successfully. Part III. *Western Machinery and Steel World,* v. 39, March 1948, p. 111.

Recommended tool-positioning and machine-checking procedures.

20a-134. Correct Use of Standard Equipment Pays Dividends in Chip Disposal. *Flow,* v. 3, March 1948, p. 26-27, 49.

Jack & Heintz method of disposal from machine to scrap-removal truck.

20a-135. Thread Cutting in the Lathe. Carl Thomas. *Power Generation,* v. 52, March 1948, p. 72-76.

Instructions for cutting threads of various kinds.

20a-136. Two Successful Jobs by Skiving. J. Harrow. *Screw Machine Engineering,* v. 9, March 1948, p. 33-37.

Details of setups for production of two different designs of the metal part at the tip of an automatic pencil.

20a-137. Milling a Hexagon With a Cross Slide Attachment. E. P. Ranney. *Screw Machine Engineering,* v. 9, March 1948, p. 40-43, 46.

A special attachment which, when applied to a standard automatic screw machine, makes it possible to complete the part on one machine tool.

20a-138. Profile Turning a Cam Contour on the Brown & Sharpe Automatic. A. F. Barker. *Screw Machine Engineering,* v. 9, March 1948, p. 47-49.

20a-139. Disk-Type Screw Machine Cam Cutter. A. G. Jacobson. *Screw Machine Engineering,* v. 9, March 1948, p. 50-52.

Attachment and its uses.

20a-140. Automatic Work-Indexing Device for Milling Machine. *Machinery* (London), v. 72, March 4, 1948, p. 307-308.

20a-141. Power Feeding Mechanism for Band-Saw. *Machinery* (London), v. 72, March 4, 1948, p. 309-311.

Patented mechanism for use on metal-cutting band-saws.

20a-142. German Machine Tool Developments. *Iron Age,* v. 161, March 25, 1948, p. 77.

Series of reports issued by the Office of Technical Services, U. S. Dept. of Commerce.

20a-143. Shop Shots at Lord Mfg. Co. Walter Rudolph. *American Machinist,* v. 92, March 25, 1948, p. 96-97.

Six operations utilizing unusual machining techniques.

20a-144. Practical Ideas. *American Machinist,* v. 92, March 25, 1948, p. 117-122.

Use of gage-block assemblies to build-up precise snap and limit-snap gages (S. Framurz); drilling of large panels by use of portable drill press mounted on top of the panels using a metal strip attached by clamps (Harry Stern); use of sample part for gage turning of new part to identical taper (Don J. W. Tibbits); improved procedure for finishing shoulders (Lewis F. Cheek); cutting splines by use of set of broaches with single progressive edges (Harry Stern); use of dial gage to indicate deviation from perfect square or from vertical position (D. P. Campbell); conversion of lathe steadyrest to ball-bearing rest to eliminate stock marking (William E. Blackham); and other miscellaneous shop hints.

20a-145. By Honing Cylindrical Parts Fast Stock Removal, Fine Finish and Close Accuracy Are Obtained. C. Allen Fulmer. *Machine and Tool Blue Book,* v. 44, April 1948, p. 133-138, 140, 142.

Advantages and applications of honing process. Various parts which have been successfully honed. Honing abrasives and procedural suggestions.

20a-146. First Transfer Machine for Drilling Crankshaft Oil Holes. *Automotive Industries,* v. 98, April 1, 1948, p. 36, 76.

Machine introduced by Ford Motor Co.

20a-147. Positive Locating Drilling Jig. Robert Mawson. *Iron Age,* v. 161, April 1, 1948, p. 83-85.

Positive location of the part to be drilled, quick positioning, and ease in handling, are features of the jig. Although designed for a specific part, the idea may be applied to other drilling operations.

20a-148. Pin Hole Drilling Simplified With All-Purpose Jig. Robert Mawson. *Steel,* v. 122, April 5, 1948, p. 91, 94.

Universal drill jig for drilling small holes in studs, bolts, and pins.

20a-149. Cams—Their Production and Application. John E. Hyler. *Machine and Tool Blue Book,* v. 44, April 1948, p. 179-180, 182, 184, 186, 188, 190.

Fourth of series discusses types of cam followers and machines for cam milling. (To be concluded.)

20a-150. A Back Facing Tool for Use on the Drilling Machine. G. R. Milner. *Machinery* (London), v. 72, Feb. 19, 1948, p. 246.

Tool permits rapid back-facing of internal bosses to length. It is of simple construction, and can be used on any drilling machine without disturbing the workpiece or reversing the machine spindle.

20a-151. Modern Cutting Tools and Machine-Tool Design. C. Eatough. *Engineering,* 165, Feb. 20, 1948, p. 189-192. A condensation.

Previously abstracted from *Engineer,* v. 185, Jan. 9, 1948, p. 53; discussion, p. 52; Jan. 16, 1948, p. 75-77. See item 20a-130, R.M.L., 1948.

20a-152. Gage and Tool Exhibition, 1948. Paul Grodzinski. *Industrial Diamond Review,* v. 8, March 1948, p. 69-78.

Equipment at British show.

20a-153. Present Status of Crush-Truing. D. H. Currie. *Industrial Diamond Review,* v. 8, March 1948, p. 82-84.

History; the wheel required; centerless thread grinding; lubricants; and other applications. (Presented at A.S.T.E. meeting, Detroit, March 19, 1947.)

20a-154. New Plant and Tools. *Automobile Engineer,* v. 38, March 1948, p. 106-108.

Recent development in production machine-shop equipment.

20a-155. Lifting Arrangements for Jig Plates. R. Harries. *Machinery (London),* v. 72, March 11, 1948, p. 343-344.

20a-156. Cost Saving on Slot Milling Operations. *Machinery* (London), v. 72, March 11, 1948, p. 345-347.

As used in production of radiator cores.

20a-157. Two Large British Machine Tools. *Engineer,* v. 185, March 12, 1948, p. 255-257.

Gear-hobbing machine capable of cutting gears up to 21 ft. in diameter and 8 ft. in width; and boring-and-turning mill for work up to 24 ft., 3 in. diameter by 15 ft. high.

20a-158. Boring Bars for Horizontal Machines. G. R. Milner. *Machinery* (London), v. 72, March 18, 1948, p. 366.

20a-159. Contour Milling of Grooves. *Machinery* (London), v. 72, March 18, 1948, p. 373.

Method used for milling slot in cylindrical parts so that the bottom surfaces of the slots are parallel over part of their length and tapering for the remainder.

20a-160. Coolants for Metal Working. E. L. H. Bastian. *Lubrication Engineering,* v. 4, April 1948, p. 75-80.

Various types and their maintenance and selection for specific applications. Machining and metal working applications, in the latter of which the "coolants" are more properly referred to as "lubricants".

20a-161. Fats and Oils for Grinding and Polishing. E. W. Steinitz. *Lubrication Engineering,* v. 4, April 1948, p. 81-85.

Properties of the various substances used as suspending liquids for abrasives.

20a-162. Machining and Assembly Operations on the Automatic. S. L. Daugherty, *Screw Machine Engineering,* v. 9, April 1948, p. 31-35.

Production and assembly operation on a comparatively simple screw-machine part with a 0.87-in. steel ball assembled within a 0.188 in. hole and the 45° angle spun over to secure the ball within the part. The ball must be assembled in a manner so that it rotates freely without excessive shake or end movement.

20a-163. Squaring a Round Hole. E. P. Ranney. *Screw Machine Engineering,* v. 9, April 1948, p. 37-40.

Sequence of operations and feeds and speeds applied to produce part requiring above operation complete in 5 sec. on a $\frac{9}{16}$" RA6 Acme Gridley automatic.

20a-164. Increase Production 200% With Skiving Tools. A. F. Parker. *Screw Machine Engineering,* v. 9, April 1948, p. 41-44.

Second of a series of articles dealing with screw-machine techniques in manufacture of cameras. Production of complex part with only 0.0155-in. wall thickness between a 0.125-in. hole and the 0.156-in. outside diameter. In addition, overall length is four times the outside diameter. The problem is to drill and form this piece without the part twisting from the bar.

20a-165. Pitfalls to Avoid in Tooling Screw Machines. Part I. Noel Brindle. *Screw Machine Engineering,* v. 9, April 1948, p. 46-50.

The following factors which contribute to the success of many setups; use of two open and opposite turret holes on long parts extending through the turret; indexing the turret only once after severing the part from the bar; nonuse of double index; checking for swing-tool-body interference; checking for cut-down on a lead cam lobe which may result in insufficient turret travel.

20a-166. Stock Ends. *Screw Machine Engineering,* v. 9, April 1948, p. 53.

Revolving Stop, by T. Rehn; Tap Drill Formula, by Foster Marten; Small Drill Bushings, by Charles Heinz; Adjustable Roller-Type Turret Support, by T. Rehn.

20a-167. Diamond Bandsawing. *Aircraft Production,* v. 10, April 1948, p. 129.

High cutting rates on hard materials by use of diamond bandsaw.

20a-168. Specialized Machining. *Aircraft Production,* v. 10, April 1948, p. 141-144.

Details of solution of an unusual problem in boring and drilling which was encountered in production of hydraulic activating units for a British plane.

20a-169. Transfer Machine for Automotive Axle Housings. *Product Engineering,* v. 19, April 1948, p. 96-97.

"Transfermatic" finishes both ends of automotive rear-axle housings at the rate of 152 axles per hour with one operator.

20a-170. Setups for Grinding Milling Cutters. Freeman C. Duston. *Machinery,* v. 54, April 1948, p. 168-173.

Procedures in sharpening milling cutters, end mills, formed cutters, and similar tools—second of two articles.

20a-171. High-Speed Cycling. R. H. Clark. *Machine Design,* v. 20, April 1948, p. 101-104.

Use of automatic electric controls in a turret lathe. Special design features reduce inertia of drive, increasing production.

20a-172. "News" on the Production Front. Rex Heath. *Tool Engineer,* v. 20, April 1948, p. 29-34.

New developments in machine tools.

20a-173. Drill Fixture for Machine Tool Headstock. Robert Mawson. *Tool Engineer,* v. 20, April 1948, p. 38.

Ingeniously designed tool for small-lot production of precision parts.

20a-174. Optical Grinding—The Latest Development in Toolmaking. Charles H. Wick. *Machinery,* v. 54, April 1948, p. 154-160.

Extremely accurate profile shapes on parts such as form tools, lamination dies, and templets are being ground quickly and economically by means of optical grinding machines.

20a-175. Broaching Improves Accuracy of Cam Teeth Surfaces. *Production Engineering & Management,* v. 21, April 1948, p. 58.

Application to telephone-relay part having series of cam-shaped slots corresponding to the 10 numbers on a dial phone.

20a-176. The Crib. *Production Engineering & Management,* v. 21, April 1948, p. 73.

Floating Skiving Tool, John H. Hill; and An Adjustable Tracer, J. G. Betz.

20a-177. Grouped Parts Multiple-Machined. F. H. Scriber. *American Machinist,* v. 92, April 8, 1948, p. 90-91.

Four swivel bases are fixtured for simultaneous machining.

20a-178. Practical Ideas. *American Machinist,* v. 92, April 8, 1948, p. 121-126.

Milling machine cuts slotted cams using removable fixtures on table, by Frederick C. Lurz; bar setup on planer to locate trace for turning hourglass shape, by Ralph Egolf; lathe spider to support cylinder on completion of counterboring, by Robert J. Lemp; gage modification for measuring deep, small-diameter holes, by Edward Diskavich; makeshift mike for large work built

from discarded snap gage, by George Werner; block gage centers jig borer over edge of work for hole location, by Caris Sorenson; fixture to hold pins for machining both screwdriver and keyway slots at once, by H. Moore; drill shank holds center drill for rapid tail-stock assembly, by Allen B. Nixon; and other miscellaneous shop hints.

20a-179. Methods of Driving Straight-Shank Drills. *American Machinist,* v. 92, April 8, 1948, p. 145.

20a-180. High Production Broaching. *Iron Age,* v. 161, April 15, 1948, p. 72-75.

Work which has been done in broaching small stampings and intricately shaped machine parts. By standardizing fixtures, clamping devices, and locaters, these parts are interchangeable on various machines. More than a thousand types of parts are being broached regularly.

20a-181. Carbide Inserts for Single Point Tools. Thomas E. Lloyd. *Iron Age,* v. 161, April 15, 1948, p. 82-83.

Several companies are experimenting with the development. Little information is available concerning the results; advantages which are apparent without such results.

20a-182. Machining Cylinder Blocks for the New Austin Car. *Machinery* (London), v. 72, April 1, 1948, p. 419-427.

Method and equipment used by British firm.

20a-183. Broach-Tap Cuts Quintuple Threads. Harry S. Wharen. *American Machinist,* v. 92, April 22, 1948, p. 69-72.

High-helix quintuple thread requires tricky design of combination broach-taps that are pushed through the work in hydraulic broaching machines.

20a-184. Drilling Kinks Cut Machine Downtime. Chester S. Ricker. *American Machinist,* v. 92, April 22, 1948, p. 94.

Modification of torque wrench to record in oz-ft. for easy setting of torque controls on drilling heads of multiple-head machines; and quick change of drills for blind holes that must be held to accurate depth by presetting of drill in an intermediate insert fitting between the drill spindle and the drill.

20a-185. Practical Ideas. *American Machinist,* v. 92, April 22, 1948, p. 95-100.

Turning parts too large for lathe on the milling machine, by Frederick C. Lurz; fixture for wheel dresser for accurate radius and arc cuts, by Allen B. Nixon; positioning block to locate four equally spaced keyways on bar stock, by J. J. Kocinski; universal fixture to hold work at odd angles, by F. Scriber; fixture mounted on bench drill to test flat springs, by Fred Lettino; making rectangular hole in block using only common machine tools, by Fredrico Strasser; V-block guides punch and drill for shaft layout and machining, by George Holman; improved vise for thin stock, by Clifford T. Bower; slotted strap adjusts punch-press feed stop both horizontally and vertically, by Burnett Menkin; accurate multiple threads cut by use of vernier on compound rest, by Everett Odell; and other miscellaneous shop hints.

20a-186 Methods of Work Clamping. *American Machinist,* v. 92, April 22, 1948, p. 107, 109, 111.

Methods for typical jobs.

20a-187. Air-Brake Clamping Jigs Speed Machining of Bus Parts. Walter Rudolph. *Steel,* v. 122, April 26, 1948, p. 109-110.

And other production aids.

20a-188. Calculating the Cams for Automatic Lathes With Movable Headstock. André Daetwyler. *Microtecnic,* v. 2, Feb. 1948, p. 21-32. Translated from the French.

Series of examples with a thorough analysis of each operation.

20a-189. The Calculation of the Most Favorable Working Conditions for Chip Producing Machining Operations. J. Witthoff. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 109-114. Translated and condensed from *Werkstatt und Betrieb,* v. 80, April 1947, p. 77-84.

Derives equations and presents nomographs. Both cost and technological factors are considered.

20a-190. Thread Cutting in the Lathe. Part II. Carl Thomas. *Power Generation,* v. 52, April 1948, p. 76-78.

Exact procedure involved in thread cutting.

20a-191. Workshop Hints and Tips. *Machinery Lloyd* (Overseas Edition), v. 20, April 10, 1948, p. 85-87.

Milling splines; hobbing threads; tapping light metals; broaching; grinding; gear cutting; making gear hobs and master racks.

20a-192. Sound Tool Engineering Pays Dividends. Robert S. Potter. *Machinery,* v. 54, May 1948, p. 147-154.

Unusual setups on multiple-spindle chucking, precision boring, lapping, and drilling machines used in producing door-closer components.

20a-193. Cams—Their Production and Application. John E. Hyler. *Machine*

and Tool Blue Book, v. 44, May 1948, p. 155-158, 160, 162, 164-166, 168.

Final installment of five-part series.

20a-194. Clearance Is Important! John E. Hyler. *Modern Machine Shop,* v. 20, May 1948, p. 124-128, 130, 132.

Modern tools and gages designed to simplify the task of obtaining correct clearance angles in grinding tools.

20a-195. Tooling and Production of the Apex Fold-A-Matic Ironer. Part IV. Carl F. Benner. *Tool & Die Journal,* v. 14, May 1948, p. 58-62, 64, 96-97.

Continuing description of machining and tooling operations on the gear case. Rough core drilling; spot face checking; milling inside boss; inside boss checking fixture; and front face drilling and reaming operations. (To be continued.)

20a-196. Optics Aid Work Location. Robert Hutcheson. *Tool & Die Journal,* v. 14, May 1948, p. 72-74, 85.

British development of the use of the toolmaker's microscope to facilitate the location of work for accurate machining.

20a-197. Ideas From Readers. *Modern Machine Shop,* v. 20, May 1948, p. 192, 194, 196, 198, 200, 202.

Shaping Machine Chip Trays, Clifford T. Bower; Measuring Tape for Draftsman's T-Square, A. H. Waychoff; Formulas for Grinding Cutter Clearance Angles, L. Kasper; Form Turning Attachment, Robert Mawson.

20a-198. Practical Ideas. *American Machinist,* v. 92, May 6, 1948, p. 123-128.

Includes the following: slotter forms threadlike cuts as crank positions unusual job, by C. D. MacKinnon; contour-grinding work fed by bar-and-cam mechanism, by Harry R. Ball; microswitch cuts off drill press when lever hits button, by Donald P. Campbell; pin stop locates and ejects stock with spring-loaded mechanism in press work, by Chris Soreson; motor brushes finished by milling-and-lapping fixture, by Edward Lay; inside threads gaged with thread-chasing fixture, N. J. Elby; punch design reduces stresses for blanking and perforating, by Frederico Strasser; drill press setup for grinding radii on cutting tools and toolbits, by Harry Stern; boring bar cuts internal sphere with link-driven rotating tool, by A. Wagner; use of motor-driven attachment to make drill press automatic, by Joseph F. Budnick; and other miscellaneous shop hints.

20a-199. Damped Quill Stops Self-Excited Chatter, E. J. Tangerman. *American Machinist,* v. 92, May 6, 1948, p. 93-95.

Weight damper applicable to quills and boring bars. It avoids outboard supports, permits blind-hole boring without chatter problems.

20a-200. Machining Motor Car Engine Components. *Machinery* (London), v. 72, April 15, 1948, p. 475-480.

Methods employed in production of the new Austin car.

20a-201. The Manufacture of Austin Brake Drums and Other Parts. *Machinery* (London), v. 72, April 22, 1948, p. 503-509.

Methods employed.

20a-202. Modified Geneva Drive for Hi-Speed Machines. Paul H. Winter. *Tool Engineer,* v 20, May 1948, p. 23-24.

Use of old principle to provide uniform motion and shockless acceleration.

20a-203. The Tool Engineer's Industrial Exposition in Review. A. E. Rylander. *Tool Engineer,* v. 20, May 1948, p. 35-43.

20a-204. Work Holding Fixtures for Production Broaching. *Production Engineering & Management,* v. 21, May 1948, p. 56-59.

(To be continued.)

20a-205. Recommended Procedure for Grinding Circular Form Tools. Charles L. Hall. *Production Engineering & Management,* v. 21, May 1948, p. 60.

Use of formula given simplifies the procedure for setting up circular form tools perpendicular to the machine table, and for grinding to a specified rake angle.

20a-206. Fixture for Offsetting. Elbridge R. Holmes. *Production Engineering & Management,* v. 21, May 1948, p. 75.

When it is desired to form an offset in a number of pieces of light weight sheet metal or flat bar stock, and the number of parts required does not justify making an elaborate fixture, a fairly uniform offset in all of the pieces can be obtained by using the method shown in the accompanying sketch.

20a-207. Vertical Slide Performs Grooving Operations. G. A. Hunt. *Screw Machine Engineering,* v. 9, May 1948, p. 41, 44-46.

Application in the production of two grooves spaced 2⅛ in. apart on a part 5 7/16 in. long.

20a-208. Pitfalls in Tooling the Screw Machine. Part II. Noel Brindle. *Screw*

Machine Engineering, v. 9, May 1948, p. 47-51.

Four very important and often overlooked tooling fundamentals: reduce cut-off feed when producing a radius on cut-off end of part; use of swing or turret type stop; turning instead of forming for tubing to prevent workhardening; and points on drilling or turning beyond standard length capacity.

20a-209. Stock Ends. *Screw Machine Engineering,* v. 9, May 1948, p. 59.

Combination Turret Stop and Support, by Charles Heinz; Drill Stop, by George Schrader; and Burring Parts, by Charles Heinz.

20a-210. Automatic Transfer Machining of Rear Axle Housings. *Machinery* (London), v. 72, April 29, 1948, p. 534.

Method used.

20a-211. Recommendations for Drilling Various Materials. *Machinery* (London), v. 72, April 29, 1948, p. 543.

A table.

20a-212. Modern Machining of Center Holes. *Industrial Diamond Review,* New Series, v. 8, May 1948, p. 152-154.

Special British and Swiss machines.

20a-213. Gearing the West. Ralph G. Paul. *Western Machinery and Steel World,* v. 39, May 1948, p. 70-73.

Production of gears on West Coast.

20a-214. Improved Accuracy of Cam Teeth Surfaces. *Western Machinery and Steel World,* v. 39, May 1948, p. 84.

Manufacture of precision telephone-relay part by broaching after blanking.

20a-215. Berkeley's Univator. *Western Machinery and Steel World,* v. 39, May 1948, p. 88-91.

Production of unique piece of farm machinery designed to do the work of plow, disk and harrow all in one operation.

20a-216. Sharpening and Care of Carbide Milling Cutters. *Western Machinery and Steel World,* v. 39, May, 1948, p. 94-97. Reprinted from "Milling with Carbides", a publication of the Milling Cutter Division of the Metal Cutting Tool Institute.

20a-217. Fixtures for Duplex Surface Grinders. R. D. Gardner. *Machinery* (London), v. 72, April 29, 1948, p. 531-534.

Several types.

20a-218. Centerless Grinding Fountain-Pen Nib Sections. *Machinery* (London), v. 72, May 6, 1948, p. 565.

20a-219. Recent Developments in Crush Dressing Abrasive Wheels. E. C. Luce. *Machine and Tool Blue Book,* v. 44, June 1948, p. 151-156, 158.

Tests proved the practicability of crush dressing and grinding contour forms as wide as 2 in. and approximately ⅛ in. to 3/16 in. in depth. Equipment procedure for these tests.

20a-220. Honing Is Precision Production. *Tool and Die Journal,* v. 14, June 1948, p. 50, 52, 54, 64.

Development of controlled stones; speed of stock removal; production-honing uses; examples of production rates; abrasive engineering progress; stone specification; honing speeds and feed; honing pressure and power; coolants for honing; coolant filtration; the problem of taper in blind holes and its correction; and distortion correction by honing.

20a-221. Machine Tools. A. H. Lloyd. *Institution of Mechanical Engineers, Proceedings,* v. 157, War Emergency Issue No. 32, 1947, p. 295-298.

A discussion of the above in terms of future prospects for design and manufacture which contribute to accuracy, durability, and productivity.

20a-222. Cutting Fluid Developments. J. M. Stewart. *Automobile Engineer,* v. 38, May 1948, p. 183-184.

Characteristics of sulpho-chlorinated oils for machining processes, including applications, health factors, and reclamation.

20a-223. Machining Motor Car Cylinder Heads and Manifolds; Methods Employed in the Production of the New Austin Car. *Machinery,* (London), v. 72, May 13, 1948, p. 587-592.

20a-224. A South African Firm's Adventures in the Field of Munitions Production. Based on paper by H. M. D'Aeth. *Machinery,* (London), v. 72, May 13, 1948, p. 596-599.

Development of special-purpose machine tools for production of 10-lb. practice bombs.

20a-225. New Developments in Honing. Charles H. Wick. *Machinery,* v. 54, June 1948, p. 145-150.

Fundamental principles of the process.

20a-226. Shaft Duplicating in Single-Tool Lathe Operations. *Machinery,* v. 54, June 1948, p. 151-155.

Cylindrical work which can be accurately reproduced at high production rates on lathes equipped with a finish-turned part or templet and a hydraulically-controlled single cutting tool.

20a-227. Design and Application of Carbide-Tipped "All-Depth" Drills.

Fred W. Lucht. *Machinery,* v. 54, June 1948, p. 156-160.

Use of drills of this type in obtaining high production rates, higher feeds, and long drill life between grinds. Large holes can be drilled from the solid instead of having to remove material by several successive drilling operations, and deep holes can be drilled without withdrawing drill to clear the chips.

20a-228. Producing Intricate Parts on a Multiple-Purpose Machine Tool. Ira P. Mabie. *Machinery,* v. 54, June 1948, p. 182-184.

Production of castings for package-making machines on a single horizontal boring, drilling, and milling machine. Production is increased and cumulative errors resulting from separate setups are eliminated.

20a-229. Tool Engineering Ideas. *Machinery,* v. 54, June 1948, p. 196-198.

A Simple Setup for Turning Concave Surfaces, by Clifford T. Bower; New Die Frame Design That Saves Labor and Material, by Robert Mawson; Novel Thrust Shoulder for Grinding-Wheel Spindle, by Donald A. Baker.

20a-230. Tooling and Production of the Apex Fold-A-Matic Ironer. Part V. Carl F. Benner. *Tool & Die Journal,* v. 14, June 1948, p. 42-46, 48, 68, 70.

Production of the gear case. Boring shaft holes and bosses; checking centerline dimensions; drilling top-cap-attaching hole; fixture for multi-tapping head; speed-control marker; and tapping universal coupling shaft boss. (To be continued.)

20a-231. Automatic Precision Production to "Tenths" Without Jigs. *Tool & Die Journal,* v. 14, June 1948, p. 56-58, 60.

Construction, operation, and advantages of DeVlieg machine tool known as the "Jigmil".

20a-232. Production Processes—Their Influence on Design. Part XXXIV. Honing and Lapping. Roger W. Bolz. *Machine Design,* v. 20, June 1948, p. 133-139.

Equipment, procedures, and applications.

20a-233. Carbide-Tipped All-Depth Drills Have Wide Range of Applications. Fred W. Lucht. *Automotive Industries,* v. 98, June 1, 1948, p. 44-45, 82.

Also abstracted from *Machinery,* v. 54, June 1948, p. 156-160. See item 20a-227, 1948.

20a-234. Air Gage Controls Size of Cylinder Bore. *Compressed Air Magazine,* v. 53, June 1948, p. 143.

Equipment used in production of automobile cylinder blocks.

20a-235. Reducing Processing Time With Abrasive Wheel Cutting. J. C. Arndt. *Production Engineering & Management,* v. 21, June 1948, p. 69-71.

Many second operations on cut ends can be eliminated and an appreciable saving in time and cost effected.

20a-236. Reduced Handling Time Holds Key To Increased Production Rates. *Production Engineering & Management,* v. 21, June 1948, p. 77-79. Based on paper by Myron S. Curtis.

Faster cutting speeds with greatly increased horsepower can be overemphasized in relation to greater productivity obtainable by reducing handling time on machine tools.

20a-237. Higher Production Standards With All-Depth Carbide Drills. Fred W. Lucht. *Production Engineering & Management,* v. 21, June 1948, p. 55-60.

Abstracted from *Machinery,* v. 54, June 1948, p. 156-160. See item 20a-227, 1948.

20a-238. Hydraulic Circuits Speed Production in a Multiple Operation Machine. Robert L. Brehm. *Applied Hydraulics,* v. 1, June 1948, p. 20-22.

20a-239. Cutting and Fragmentation Formulas. Emil Kuhn. *Tool Engineer,* v. 20, June 1948, p. 22-26.

Results of studies on the fundamentals of metal cutting.

20a-240. It Pays to Experiment. George W. Bruck. *Tool Engineer,* v. 20, June 1948, p. 36.

Flood cooling and the right grinding wheels increase production and improve surface finish.

20a-241. Eccentric Forming and Turning on the Multiple Spindle Automatic. Robert Beacom. *Screw Machine Engineering,* v. 9, June 1948, p. 29-33

20a-242. Cross Slide Cam Grooving Attachment for Brown & Sharpe Automatics. Part 4. A. F. Parker. *Screw Machine Engineering,* v. 9, June 1948, p. 34-38.

Use for production of small camera part.

20a-243. Pitfalls to Avoid in Tooling Screw Machines. Part III. Noel Brindle. *Screw Machine Engineering,* v. 9, June 1948, p. 40-44.

The combination or elimination of operations to conserve on turret position; and checking for interference between turret tools and bed of turret when drilling or reaming inside the collet.

20a-244. Stock Ends. *Screw Machine Engineering,* v. 9, June 1948, p. 47.

Adjustable Grooving Tool Holder, by H. Smith; Drill Stop, by Charles Heinz; and Adjustable Over-All Length Gage, by Raymond J. Braski.

20a-245. How Gear Shaving Works. Sidney Cornell. *American Machinist,* v. 92, June 3, 1948, p. 94-98.

Basic principles of relatively new process for finishing gears.

20a-246. Practical Ideas. *American Machinist,* v. 92, June 3, 1948, p. 118-122.

Production of serrated, tapered shaft by tool held in turret lathe, by G. R. Milner; toolslide set at angle for accurate turning and boring, by E. R. Vernon; milling-way holder for rods replaces height gages, by John Neumann; conversion of vertical milling machines to jig boring by use of vernier caliper, by Chris Sorenson; use of watchmaker's bench lathe to cut off and drill small hubs, by Charles H. Willey; micrometer attachment for gaging walls of small tubing, by James Cuyler; screw-machine form-tool step protects carbide-tool insert, by W. E. Allen; changes in punch press methods stop strip-stock distortion, by S. Framurz; surface grinding of cutoff saw to reduce edge thickness, by Norman L. Naidish; drilling of 0.003-in. diameter holes in ⅜-in. annealed block, by F. Webster; fixture for tapping threaded holes in the heads of studs, by Charles H. Willey; and other miscellaneous shop hints.

20a-247. Carbide Drills. Fred W. Lucht. *American Machinist,* v. 92, June 3, 1948, p. 133, 135, 137.

Data on general design, standard sizes, methods of attachment, and drill grinding.

20a-248. Shop Shots at Electrolux. *American Machinist,* v. 92, June 17, 1948, p. 96-97.

20a-249. Bearing Housings Drilled With Rail Fixture. L. C. Heinlein. *American Machinist,* v. 92, June 17, 1948, p. 114.

20a-250. Valve-Stem Guides Finish Ground Automatically. R. R. Coulette. *American Machinist,* v. 92, June 17, 1948, p. 125.

How cast-iron valve-stem guides are handled automatically through two centerless grinders and a special washing machine.

20a-251. Practical Ideas. *American Machinist,* v. 92, June 17, 1948, p. 126-130.

Mathematical formula for location of idler in offset gear-pinion mechanism, by Henry L. Ahner; angle ground on 6-in. scale forms tool for gaging slots, by William A. Adams; prevention of breakage of small drills by magnetization, which allows easy removal of chips from the holes—the principal cause of breakage, by Elgani Stump; double-gear screw-machine tool turns external radius on shaft, by Theodore Oshinsly; cam-and-rack attachment for speeding action of vise, by Allen B. Nixon; engine-mounted hand turner trues up damaged crank pins, by John T. Zurlo; work-aligning attachment for speeding up angle-plate setup, by H. Moore; three knurled rings hold knurled part for drilling, by R. B. Ware; ball-turning lathe attachment cuts hand feed, raises speed, by Walter Milewski; improved technique for grinding chuck jaws, by Chris Sorenson; and other miscellaneous shop hints.

20a-252. Thread Cutting in the Lathe. Part III. Carl Thomas. *Power Generation,* v. 52, May 1948, p. 78-79.

Cutting Acme threads; threading tools for cutting square threads; Whitworth threads; formula for cutting metric screw threads; cutting multiple threads; and electrical-coil winding on the lathe.

20a-253. Self-Opening Die Heads. H. Balmer. *Machinery* (London), v. 72, May 27, 1948, p. 651-653.

Equipment for thread cutting.

20a-254. The Production of Cotton Spinning Spindles. *Machinery* (London), v. 72, June 3, 1948, p. 671-674.

Modern methods of turning and grinding.

20a-255. Lathe Set-up for Continuous Threading of Bar Stock. M. W. Purser. *Machinery* (London), v. 72, June 3, 1948, p. 682.

Method for threads on long pieces of bar stock by means of a die-head rotated in the chuck of a small engine lathe, through which the bar is fed.

20a-256. Transfer Line Drills Ford Crankshafts. Walter G. Patton. *Iron Age,* v. 161, June 17, 1948, p. 72-76.

Special transfer-type drilling machine, utilizing step drilling, produces 60 crankshafts per hr. The tooling and operating sequences and other novel features of the line.

20a-257. Carbide Drills. Fred W. Lucht. *Iron Age,* v. 161, June 17, 1948, p. 88-90.

Three types now in use. Drill design, sharpening techniques, machines on which they are used, cooling and lubrication, the cutting speeds and feeds.

20a-258. Fine Drilling Attachment for Swiss-Type Automatic. *Machinery* (London), v. 72, May 27, 1948, p. 647.

20a-259. Novel Diamond Truing Devices for Grinding Jet Engine Turbine Blades. *Industrial Diamond Review,* v. 8, June 1948, p. 178-180.

20a-260. Use and Care of Diamond Tools for Truing Thread Grinding Wheels. *Industrial Diamond Review,* v. 8, June 1948, p. 183-185. Condensed from *A.S.M.E. Metal Cutting Data,* v. 3, Nov. 1947, p. 3-6.

20a-261. Servo Electronic Control of a Large Planing Machine. *Engineer,* v. 185, June 4, 1948, p. 542-543.

20a-262. Rapid Abrasive Wheel Cutting. *Machinery Lloyd.* (Overseas Edition), v. 20, June 19, 1948, p. 80-83.

Types of cutoff machines and suggestions for increasing wheel life.

20a-263. Sharpening Carbide Tools. Charles H. Wick. *Machinery,* v. 54, July 1948, p. 145-151.

Recommended methods and equipment, based on a comprehensive survey of manufacturers and users of carbide tools, grinding machines, and abrasive wheels. (To be continued.)

20a-264. Milling Complex Contours on Multiple-Spindle Machines. *Machinery,* v. 54, July 1948, p. 152-154.

Several typical setups.

20a-265. New Developments in Honing. (Concluded). Charles H. Wick. *Machinery,* v. 54, July 1948, p. 162-169.

Points to be considered in the design of tools, fixtures, and machines for honing; outstanding applications of this process.

20a-266. Electrical and Electronic Controls for Form-Duplicating Machines. H. C. Town. *Machinery,* v. 54, July 1948, p. 193-196.

Details of the controls.

20a-267. Factors Influencing the Quality of Ground Gears and Worms. Part I. L. P. Tarasov. *Modern Machine Shop,* v. 21, July 1948, p. 124-130, 132, 134, 136, 138, 140.

Types of defects; how to recognize probable origin of surface defects and how to avoid them. (To be continued.)

20a-268. Carbides Boost Dairy Equipment Production at International Harvester. L. W. Court. *Modern Machine Shop,* v. 21, July 1948, p. 190, 192, 194, 196, 198, 200, 202.

20a-269. Ideas From Readers. *Modern Machine Shop,* v. 21, July 1948, p. 204, 206, 208, 210, 212.

Simplified Setup for Measuring Tapers, by R. Richards; Light Stampings From Universal Pump Jig, by Roger Isetts; Simple Method for Removing Broken Center Drill, by Fritz L. Keller; Holding Device for Coiled Spring Wire, by A. H. Waychoff.

20a-270. Reduce Maintenance Costs Through Automatic Lubrication of Machine Tools. Francis Westbrook. *Machine and Tool Blue Book,* v. 44, July 1948, p. 131-134, 136, 138-141.

Various types of lubrication systems.

20a-271. Production Problem Solved by Ingenious Tooling. Frank M. Scotten. *Production Engineering & Management,* v. 22, July 1948, p. 41-43.

How effective machine time was increased by ignoring precedent when designing a new broaching tool.

20a-272. Drill Jig Efficiency Increased by Swinging Leaf. Roger Isetts. *Production Engineering & Management,* v. 22, July 1948, p. 48.

Ingenious drill-jig design, which eliminates the necessity of removing the drill bushing for subsequent operations and which has a broad range of applicability.

20a-273. Business Method Machines; Addressograph-Multigraph Corporation, Cleveland, Ohio. *Production Engineering & Management,* v. 22, July 1948, p. 49-56.

Typical machine-shop equipment and techniques used in production. Heat treating, bonderizing, and welding.

20a-274. Surface Broaching Fixtures For Volume Production. (Concluded.) *Production Engineering & Management,* v. 22, July 1948, p. 57-61.

Recent developments in cost-saving fixtures and their application to various types of machines for surface broaching.

20a-275. Practical Aids for Working With Tapers. George Pfeil. *Production Engineering & Management,* v. 22, July 1948, p. 63.

Machine-shop methods for taper bores and shafts.

20a-276. Air-Tracer Scans Contours in Machining Operation. *Compressed Air Magazine,* v. 53, July 1948, p. 171-172.

Air-scanning device for simplifying turning, boring, and facing irregular contour work on lathes.

20a-277. High Grinding Wheel Speeds with Balanced Friction Drives. *Electrical Manufacturing,* v. 42, July 1948, p. 108-109.

Speeds up to 90,000 r.p.m. are attained with two motors, on opposite sides of the spindle, each with a large driving disk in direct frictional contact with the driven spindle.

20a-278. Practical Ideas. *American Machinist,* v. 92, July 1, 1948, p. 112-116.

Dressing attachment for crush

forming of grinding-wheel surfaces, by Clifford T. Bower; finishing drills on cylindrical grinder, by Milton J. Curcio; templet-indicator setup planes brake dies from precut sample, by Paul E. Wasser; four-way tool-holding turret cuts engine-lathe time for small lots, by Dana J. Mulholland; sine bar dresses measured angles on outside grinding-wheel edges, by Philip Crain; duplicate punch-and-die taper cut by backhand boring system, by Gustave Remacle; shock resistant knockout for drawing die, by Roger Isetts; split collet and beveled pins for chucking long, thin work in an engine lathe, by F. H. Scriber; side-cutting shaper tool to produce short lengths of wire in gaging fixture, by J. R. Paquin; and other miscellaneous shop hints.

20a-279. Proper Jig Design Permits Its Use for Drilling of Two Different Parts. *Steel,* v. 123, July 12, 1948, p. 119, 130.

As applied to a pressure plate and a pressure plate cover.

20a-280. Air Fixtures Ease Machining and Assembly. R. E. Whinrey. *American Machinist,* v. 92, July 15, 1948, p. 92-95.

Applications of air clamping.

20a-281. Heaters Help Accuracy of Boring Machine. R. T. Rudolphson. *American Machinist,* v. 92, July 15, 1948, p. 96.

Use of thermostatically controlled electric heating elements in precision-boring machine to maintain center guide bearings at normal working temperature.

20a-282. New Applications for Subtractive-Lead Hobbing. J. W. Bergman. *American Machinist,* v. 92, July 15, 1948, p. 117-118.

Experiments proved that method was practical for hobbing any helix angle within the recommended range of lead of a given hobbing machine. Formulas for use with one of the standard hobbing machines. The subtractive-lead method is based on the principle of generating a lead by utilizing the index and feed mechanisms and nullifying or modifying this lead by utilizing the differential to produce a resultant helix angle or spur tooth.

20a-283. Concentricity to a Tenth. David Olsen. *American Machinist,* v. 92, July 15, 1948, p. 123.

Difficulty of holding size and concentricity of bushings with tiny holes is overcome with special fixture on surface grinder.

20a-284. Design and Construction of a 14-Ft. Gear Hobbing Machine; Methods Employed at the Works of Wm. Denny & Bros. Ltd., Dumbarton. B. Barback. *Machinery* (London), v. 72, June 10, 1948, p. 706-711.

20a-285. Cutting and Fragmentation Formulae. Emil Kuhn. *Tool Engineer,* v. 21, July 1948, p. 25-28.

Concludes review of studies made by the author and other contemporary investigators. 33 ref.

20a-286. Gadgets. *Tool Engineer,* v. 21, July 1948, p. 35-36.

Fixture for drilling and reaming various sized holes in gears (Robert Mawson); screw feed for tailstock of lathe (James Maltby); tool for making oil grooves on powder-metal bushings (Jos. Satoski); locator for drill jig (E. E. Woodman).

20a-287. Application of Hydraulic Equipment to Honing Machines. Earnest Y. Seborg. *Applied Hydraulics,* v. 1, July 1948, p. 20-21, 28.

Use of a two-pump hydraulic circuit to actuate a vertical honing machine. One pump is used to drive the hone reciprocating cylinder; the other, with its oil delivery divided, operates a clamping fixture, charges an accumulator, operates a spindle engagement clutch cylinder, and expands and collapses the hones.

20a-288. Production Processes—Their Influence on Design. Part XXXV. Superfinishing. Roger W. Bolz. *Machine Design,* v. 20, July 1948, p. 119-124.

The process and various typical applications.

20a-289. Improved Spindle Drive in Plain Miller. *Machine Design,* v. 20, July 1948, p. 146-148.

Gearing arrangement is such that spindle windup is held to a minimum and ample power at requisite speeds is available for all types of cutters.

20a-290. Practical Ideas. *American Machinist,* v. 92, July 15, 1948, p. 124-128.

Semi-automatic device to speed the production of short dowel pins (Clifford T. Bower); fly cutter and angled setup to cut elliptical holes on a universal-head milling machine (A. T. DeMello); snap gages made from mild steel bodies and hardened steel dowel-pin anvils (Allan Clarke); grinding marine-engine linkage by use of track-and-trolley positioner (William A. Schlesinger); unusual protractor for angles on ends of bars and tubes (Milton R. Hammond); cross-slide and compound slide assembly convert lathe

for milling; planing hyperbolic rollers (James Van Voast); magazine fixture feeds parts automatically into position for tapping (Glenn E. Shopbell); checking thread depth on lathe by sharply pointed toolbit (Federico Strasser); tooth rest made universal by adjustable ball joint (Daniel L. Mather); use of clock spring to lift shaper tool and protect work on return stroke (Daniel O'Leary); other miscellaneous shop hints.

20a-291. Spindle Noses for Lathes. *American Machinist,* v. 92, July 15, 1948, p. 137, 139.

Types recommended for different lathes. Based on new standard (A.S.A. B5.9-1948).

20a-292. Application of Servo-Electronic Control to a Planing Machine. *Machinery* (London), v. 72, June 24, 1948, p. 762-764.

20a-293. Surface Finish. F. C. Johansen. *Journal of the India Society of Engineers,* v. 13, Feb. 1948, p. 36-40; April 1948, p. 75-80.

First installment: methods used to obtain polished or smooth surfaces such as milling, grinding, lapping, electrolytic polishing; methods for determining the conditions of surfaces. Second installment: the various types of surface-finish meters and the physical effects of surface condition.

20a-294. The Manufacture of Turbine Blades for the Whittle Engine. T. A. Kestell. *Institution of Mechanical Engineers, Proceedings,* v. 158, June 1948, p. 66-82; discussion, p. 83-94.

Machine-shop techniques developed in Britain during the war.

20a-295. Foire De Paris, new series, 1948. P. Grodzinski. *Industrial Diamond Review,* v. 8, July 1948, p. 205-207, 210-214.

Machine tools, especially those utilizing diamonds, exhibited at above exhibition.

20a-296. Continuous Metal Cut-Off Methods. H. J. Chamberland. *Western Machinery and Steel World,* v. 39, July 1948, p. 96-98, 120-121.

Various abrasive-wheel and bandsaw techniques.

20a-297. Cutting-Off Blades for Screw Machines. Clifford C. Stone. *Western Machinery and Steel World,* v. 39, July 1948, p. 104-105,128.

Proper design. The cutting-off operation is said to be the source of most of the troubles encountered on hand and automatic screw machines. The two major causes for failure of a cutting-off tool, namely, incorrect clearance angles and improper setup.

20a-298. Part Made Complete Through Intricate Recessing Operation. Part 5. A. F. Parker. *Screw Machine Engineering,* v. 9, July 1948, p. 21-24.

Details of tooling for complex recessed camera part in which concentricity of one thread to another is held to extremely close limits.

20a-299. Table of Corrected Tool Diameters for Non-Top-Rake Circular Tools 2 3/8″ Diameter—1/8″ Offset. Roy M. Spaulding. *Screw Machine Engineering,* v. 9, July 1948, p. 26-28.

20a-300. Pitfalls to Avoid in Tooling Screw Machines. Part Four. Noel Brindle. *Screw Machine Engineering,* v. 9, July 1948, p. 30-33.

Turning after drilling where there is a thin wall between a drilled hole and a turned diameter; and turret knurling stock smaller than ⅛-in. diameter.

20a-301. Machine of the Industry: Standard No. 2 Automatic Screw Machine. *Screw Machine Engineering,* v. 9, July 1948, p. 34-35.

20a-302. Screw Machine Engineering Data Sheet: Comparison Chart of Cemented Carbide Grades. *Screw Machine Engineering,* v. 9, July 1948, p. 36.

20a-303. Stock Feed Mechanism Uses Carbide Rolls. *Screw Machine Engineering,* v. 9, July 1948, p. 37.

Under actual production tests, solid carbide feed rolls, used in conjunction with a roller feed and timing mechanism on a B. & S. automatic screw machine are lasting more than ten times as long between reconditioning grinds as did the steel rolls formerly used.

20a-304. Stock Ends. *Screw Machine Engineering,* v. 9, July 1948, p. 41.

Single Bit Tool Holder, Daniel A. Hennick; Magnet Removes Small Diameter Bar Ends, Robert H. Knowles; Useful Box Tool Grind, H. Smith; and Adjustable Gage, Raymond J. Braski.

20a-305. A Simple Adjustable Reamer. *Machinery Lloyd,* (Overseas Edition), v. 20, July 3, 1948, p. 113.

20a-306. Flexible Transfer Machines. *Automotive Industries,* v. 99, July 15, 1948, p. 34-36, 78, 82.

Units for automatic machining of cylinder heads and blocks.

20a-307. Shop Shots From International Harvester Indianapolis Works. *American Machinist,* v. 92, July 29, 1948, p. 78-79.

20a-308. Sapphire Tip Bores Bushing. C. C. Scott. *American Machinist,* v. 92, July 29, 1948, p. 83.

Used for boring a brass bushing at lowered cost. The tip is bonded to the tool shank by a process developed by Sapphire Products Division, Elgin National Watch Co.

20a-309. Practical Ideas. *American Machinist,* v. 92, July 29, 1948, p. 108-112.

Roller-grip pneumatic attachment feeds strip stock to punch press (S. H. Pearson); flat forming tool in two parts is made and sharpened more quickly (Stephen E. Hancock); rotating drill-press table speeds lapping (Harold Greuel); milling setup to help cutter around die corner (D. Moore); geared disk-cam holder matches feed and rotation for milling (Clifford T. Bower); replacement of headstock bearings in old lathe for shell-reaming setup (Frederick C. Lurz); draft angle ground on cutter for milling out casting dies (John P. Harrington); and other miscellaneous shop hints.

20a-310. Factors Influencing the Quality of Ground Gears and Worms. Part II. L. P. Tarasov. *Modern Machine Shop,* v. 21, Aug. 1948, p. 144-146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168.

Recommendations for production and metallurgical factors involved.

20a-311. Ideas From Readers. *Modern Machine Shop,* v. 21, Aug. 1948, p. 198, 200, 202, 204, 206.

Adjustable Boring Bar, D. E. McDonald; Hinged Finger Facilitates Setting Up Gears, John E. Reeve; Perfect Control Beam Compass, Bert Charlesworth; and Handy Tapered Gage for Checking Drilled Holes, A. H. Waychoff.

20a-312. Mechanical Activation — a Newly Developed Chemical Process. M. C. Shaw. *Journal of Applied Mechanics,* v. 15. *(Transactions of the American Society of Mechanical Engineers,* v. 70), March 1948, p. 37-44.

In the course of a fundamental study of metal cutting, it was found that a cutting fluid encounters a rather unusual combination of conditions at the point of a cutting tool. The fluid is subjected to high local pressures and temperatures and nascent highly stressed metal surfaces. This combination of conditions will, in general, promote a chemical reaction. How the metal-cutting process may be employed in the preparation of organometallic compounds. The metal involved is cut in the presence of the other reactants, thus utilizing the surface produced to start the reaction. 16 ref.

20a-313. Helical Flute Grinding Attachment. J. Turner. *Machinery* (London), v. 73, July 1, 1948, p. 7.

20a-314. Lathe Adapted for Turning Special Dowel-Pins. *Machinery* (London), v. 73, July 1, 1948, p. 10-11.

20a-315. Optical Form Grinding. *Machinery* (London), v. 73, July 8, 1948, p. 37-40.

Control of a form-grinding operation by directly comparing an optically enlarged image of the work with an enlarged-scale drawing, as developed in the U. S.

20a-316. Jig Grinding. W. Boneham. *Aircraft Production,* v. 10, Aug. 1948, p. 282-284.

Process for accurately finishing bores, slots and other internal contours in hardened materials.

20a-317. Ground Finishes Eliminate Lapping. H. J. Chamberland. *Aero Digest,* v. 57, Aug. 1948, p. 62, 65, 120-121.

Important factors in obtaining best results from surface grinders.

20a-318. What to Watch in Metal-Polishing Costs. E. C. Bleam. *American Machinist,* v. 92, Aug. 12, 1948, p. 87-89.

Proper application of wheel, abrasive, adhesive and method of wheel setup is essential to low-cost polishing.

20a-319. "All-Depth" Drills for Shallow and Deep Hole Drilling. Fred W. Lucht. *Tool & Die Journal,* v. 14, June 1948, p. 38-41, 62. (To be continued.)

Previously abstracted from *Machinery,* v. 54, June 1948, p. 156-160. See item 20a-227.

20a-320. Deep-Drilling of Crankshafts on Transfer Type Machines. Charles H. Wick. *Machinery,* v. 54, Aug. 1948, p. 153-156, 158.

The angular, vertical, and horizontal holes are progressively drilled as the crankshafts are automatically transferred through the machine, a production of 60 crankshafts per hour being attained.

20a-321. Broach Requirements for Spline Shafts and Fittings. Harry H. Gotberg. *Mechanical Engineering,* v. 70, Aug. 1948, p. 680-682.

Broaches and broaching of splines. Many elements have to be considered in the processing of spline shafts and fittings. How broach-tool costs can be minimized by adoption of a standardized program.

20a-322. Getting the Best Results From Abrasive Wheel Cutting. J. C. Arndt. *Production Engineering & Management,* v. 22, Aug. 1948, p. 50-54.

Many factors, including material saving, cost reduction, and less operation time, recommend abrasive-wheel cutting for first operation work in mass-production plants.

20a-323. Product Output Boosted by Special-Purpose Machine. *Production Engineering & Management,* v. 22, Aug. 1948, p. 67.

Production rate for machining various types of industrial air-compressor cylinders has been more than tripled by this special-purpose machine tool. A unit of this type, when equipped with an all-electric, adjustable-speed drive system, provides certain key advantages which contribute markedly to consistent maintenance of quality control standards and repetitive uniformity in the production of parts.

20a-324. Rapid Machining Operations on Die Castings. *Iron Age,* v. 162, Aug. 19, 1948, p. 162.

Many zinc die-castings produced require minor machining operations which are done rapidly because little metal has to be removed and good tooling is applied.

20a-325. Feinschleifen und Läppen von Messflächen. (Fine-Grinding and Polishing of Surfaces to Close Tolerances.) W. Lätzig. *Metalloberfläche,* v. 1, July 1947, p. 161-163.

Advantages and disadvantages of hand and machine polishing, fine grinding with respect to accuracy of dimension and form, quality of surface, and resistance to wear and corrosion. 18 ref.

20a-326. A New Method of Drill Sharpening. (In Russian.) N. M. Neklepaev. *Stanki i Instrumenti* (Machines and Tools), no. 5, May 1948, p. 10-13.

The cutting ability of any commonly-used drill may be increased 30 to 40% by additional grinding. Method of additional grinding.

20a-327. Balanced Surface Speeds Through Spindle Speed Changes. C. H. Wummel. *Screw Machine Engineering,* v. 9, Aug. 1948, p. 20-23.

Control of appliable spindle speeds to attain highest production. Operation chart showing best setup for a worm shaft which is offered as subject for machining.

20a-328. Table of Corrected Tool Diameters for Circular Form Tools With 5° Top Rake. Roy M. Spaulding. *Screw Machine Engineering,* v. 9, Aug. 1948, p. 24-27.

Direct-reading table, range of which covers changes in diameter from 0.002 to 1.000 in.

20a-329. Pitfalls to Avoid in Tooling Screw Machines. Part 5. Noel Brindle. *Screw Machine Engineering,* v. 9, Aug. 1948, p. 28-31.

Additional problems which the screw machine engineer encounters daily. Depth of tap drill hole, cut-off tool width, and oversize feed tube for light work.

20a-330. Introduction to Cutting Tools. Part I. A. E. Rylander. *Tool Engineer,* v. 11, Aug. 1948, p. 59-60.

Proper use of planer tools. Clearance angles and proper rake. (To be continued.)

20a-331. Air Motors Operate Scroll Chucks on Milling Fixture. Leonard C. Heinlein. *American Machinist,* v. 92, Aug. 26, 1948, p. 77.

Setup giving high production in milling slots in ball-bearing housings for Link-Belt pillow blocks. These cast-iron housings are milled four-at-a-time on a four-spindle Cincinnati Hydro-Tel profile miller. Work traverse in relation to the cutters is controlled by a slotted cam plate and a profile attachment at the right of the machine.

20a-332. Sharpening Carbide Reamers. I, II, and III. *American Machinist,* v. 92, Aug. 26, 1948, p. 123, 125, 127.

Conventional sharpenings, special sharpenings, and sharpening procedure.

20a-333. Theory of Cutting of Prof. K. A. Zvorykin and "New" Theory of M. E. Merchant. (In Russian.) A. V. Pankin. *Stanki i Instrument.* (Tools and Instruments), v. 19, April 1948, p. 1-3.

After comparative investigation of Zvorykin's theory (published in 1892) and Merchant's theory (developed in 1944), the author concludes that the latter theory is the same as the former, with only slight modifications.

20a-334. Physicochemical Action of Cutting Oils During the Machining Process. (In Russian.) F. A. Bashkirev. *Stanki i Instrument.* (Tools and Instruments), v. 19, April 1948, p. 17-22.

Effect of cutting oils on machining and results of investigation of a series of 29 cutting oils of various compositions used in the U.S.S.R., as applied to different types of machining.

20a-335. A Five-Way Tapping Machine. *Machinery Lloyd* (Overseas Edition), v. 20, July 31, 1948, p. 109.

Single-purpose machine for tapping of electric conduit boxes at a production rate of from three to four boxes per minute.

20a-336. Lapping to One Millionths. R. G. Roshongs. *Western Machinery and Steel World,* v. 39, Aug. 1948, p. 108-110.

A machine for producing a finish so incredibly fine that it must be measured by standards that are 1000 times as accurate as would be necessary for ordinary grinding processes.

20a-337. Lathe Fixture for Pointing Spindles. *Machinery* (London), v. 73, Aug. 5, 1948, p. 150-151.

Fixture designed for use in machining conical points on cylindrical spindles.

20a-338. Die-Casting Dies. (Concluded.) W. M. Halliday. *Metal Industry,* v. 73, Aug. 6, 1948, p. 111-113.

Methods of eliminating machining faults.

20a-339. Involute Gear Hobbing Cutters. F. G. Watts. *Machinery* (London), v. 73, Aug. 12, 1948, p. 171-178.

Details of the development of proper designs.

20a-340. Set-Ups for Grinding Milling Cutters. *Machinery* (London), v. 73, Aug. 12, 1948, p. 179-185.

Methods recommended by Brown & Sharpe for various types.

20a-341. The Machine Tool & Engineering Exhibition. *Machinery.* (London), v. 73, Aug. 19, 1948, p. 199-251.

Equipment exhibited at British show which opened Aug. 26: lathes and boring mills; grinding and honing machines; milling machines; drilling and boring machines; gear cutting and finishing machines; sawing and cutting-off machines; presses and hammers; and planing, shaping, and slotting machines.

20a-342. Large Versus Small Hobs. *Machinery* (London), v. 73, Aug. 19, 1948, p. 253-254. Based on B.I.O.S. Final Reports Nos. 442 and 642.

Results of investigation of some large hobs found in Germany by an intelligence team. As a result of a series of tests, the investigators concluded that there is no evidence that the large hob is appreciably superior to a hob of normal size run at the same cutting speed, although it may be expected to have a proportionately longer life between successive resharpenings owing to its larger number of cutting edges.

20a-343. The Machine Tool & Engineering Exhibition. *Machinery* (London), v. 73, Aug. 26, 1948, p. 263-310.

Representative machines are described in greater detail under the headings: lathes and boring mills; grinding and honing machines; milling machines; drilling and boring machines; gear cutting and finishing machines; planing and shaping machines; presses and hammers; sawing and cutting-off machines; and miscellaneous machines.

20a-344. Setting Device for Grinding Wheel Truing Diamond. *Machinery* (London), v. 73, Aug. 26, 1948, p. 313.

Simple device for setting a truing diamond in correct relation to the grinding wheel and work centers.

20a-345. "All-Depth" Drills for Shallow and Deep Hole Drilling. Part II. Fred W. Lucht. *Tool & Die Journal,* v. 14, Sept. 1948, p. 78-81.

See abstract of "Design and Application of Carbide-Tipped All-Depth Drills," *Machinery,* v. 54, June 1948, p. 156-160. Item 20a-227.

20a-346. Safe Operation of Portable Grinders. R. B. Fair. *Foundry,* v. 76, Sept. 1948, p. 86-89, 166.

Factors to consider in use of various grinders.

20a-347. The Use and Operation of Single and Multiple Spindle Automatics. Ralph A. Warren. *Machine and Tool Blue Book,* v. 44, Sept. 1948, p. 133-136, 138, 140.

First of a series pertaining to cams, tools, etc., for use with single and multispindle automatic screw machines. This installment deals with the Brown & Sharpe machines.

20a-348. Multiple Milling Fixtures for Medium-Sized Runs. Robert Mawson. *Production Engineering & Management,* v. 22, Sept. 1948, p. 57-58.

How a six-position, indexing-milling fixture, designed for progressive positioning of the workpiece, can be modified to suit a wide range of milling operations.

20a-349. The Crib. Ideas—Kinks—Short Cuts. *Production Engineering & Management,* v. 22, Sept. 1948, p. 75.

"Removing Drill Chucks", by Ben M. Fleek; "An Emergency Drill Jig", by W. M. Goodrich.

20a-350. Practical Ideas. *American Machinist,* v. 92, Sept. 9, 1948, p. 124-128.

Die mechanism for force fitting balls onto handles (Joseph F. Budnick); tooling methods for producing reinforcing bands for chimneys (J. J. Reich); use of pre-parting punch for manufacture of tear-drop-shaped sheet-metal shape (Alexander Maxwell); sawtooth jig aligns drill for machining slots (H. Moore); turning steam fitting accurately with ball-and-socket spacer bar (W. D. Stevens); turning flat circular disks too thin to grip by edges

(George E. Caple); fixture to check form-tool grind (Bruce J. De Neve); and other miscellaneous shop hints.

20a-351. Milling Fixture Design Promotes Accuracy, Cuts Lost Motions. Robert Mawson. *Steel,* v. 123, Sept. 13, 1948, p. 122, 148.

Means of positioning workpiece made movable to compensate for changes in contour of casting or forging on which no finished surfaces can be used for locating tool.

20a-352. New Diamond Wheel Recommendations for Carbide Grinding. F. J. Benn. *Grits and Grinds,* v. 39, Aug. 1948, p. 1-5.

Selection of bond grit size, grade or hardness, diamond concentration, operating hints, and table of wheel recommendations.

20a-353. How Much Should Flange Screws be Tightened? What is the Proper Wrench Pull? A. O. Rousseau. *Grits and Grinds,* v. 39, Aug. 1948, p. 6-9.

Excessive tightening of above when mounting grinding wheels is said to be more common and more harmful than not tightening enough. Results of some experiments on a particular type of wheel and machine, and extends general recommendations for all types.

20a-354. New Machines for Sharpening Milling Cutters. *Industrial Diamond Review,* new series, v. 8, Aug. 1948, p. 243-245.

Swiss and American machines.

20a-355. The Use of Special Form Gear Shaper Cutters. *Machinery Lloyd* (Overseas Edition), v. 20, Aug. 28, 1948, p. 102-104.

20a-356. Sharpening Carbide Tools. Charles H. Wick. *Machinery,* v. 55, Sept. 1948, p. 180-184.

Relative merits of wet and dry grinding; coolants, speeds, and feeds used; and recommended methods for sharpening single-point carbide tools and grinding chip-breakers.

20a-357. Ingenious Fixture Used in Broaching Windows in Bearing Cages. *Machinery,* v. 55, Sept. 1948, p. 195.

Six windows or openings are broached in ball-bearing retainer cages by use of the fixture shown.

20a-358. Tool Engineering Ideas. *Machinery,* v. 55, Sept. 1948, p. 202-204.

Special Nose Type Chuck for a Solid-Spindle Lathe, Donald A. Baker; Quick-Acting Fixture Designed for Double Counterboring, Robert Mawson; and Die Set for Perforating Sheet Metal, Harold E. Murphey.

20a-359. Milling-Drilling Attachment Saves Handling. F. J. McArthur. *Tool Engineer,* v. 21, Sept. 1948, p. 30.

Milling-drilling fixture designed for supplementary machining operations on center and back bars for Fay automatic lathes speeds output and conserves floor space.

20a-360. The "How" of Machining Large Work. E. K. Morgan. *Tool Engineer,* v. 21, Sept. 1948, p. 31-33.

Several ingenious arrangements for using standard equipment with standard attachments for machining unwieldy work.

20a-361. Cutting and Horsepower Formula and Chart. *Tool Engineer,* v. 21, Sept. 1948, p. 34-35.

Chart allows determination of cu. in. of material removed per min. in relation to surface speed, depth cut, feed, and material diameter, also horsepower constants. Table of power constants recommended for average work and instructions for use of the chart.

20a-362. The Fundamentals of Tool Engineering. II. Cutting Tools for Engine Lathes. A. E. Rylander. *Tool Enneer,* v. 21, Sept. 1948, p. 39-40.

20a-363. Gadgets. *Tool Engineer,* v. 21, Sept. 1948, p. 41-42.

Lock for Geneva Index Table, C. W. Frank; Clamp for Right Angle Work, Clifford T. Bower; Retractible Locating Pin, John J. Boe; Plunger to Eject Work, James Maltby.

20a-364. Jigs and Fixtures at Low Cost. E. J. Weierstall. *American Machinist,* v. 92, Sept. 23, 1948, p. 126.

Hints on use of Yankee vises for holding work for machining.

20a-365. Practical Ideas. *American Machinist,* v. 92, Sept. 23, 1948, p. 131-134.

Staggered quintet of boring bits rough and finish pump-body holes (G. R. Milner); disk jigs for drilling precisely located holes (S. Framurz); chuck-jaw inserts reduce wear and improve quality of production (R. H. White); adjustable-angle tool holder positions worm-turning tool (Albert Nivers); ring-and-clevis setup clamps chuck jaws for end grinding (Martin H. Ball); small cutters deburr blind edges (W. Smele); depth gage and ground block measure curved-surface radii (Ray Cafiers); and other miscellaneous shop hints.

20a-366. Stock Allowance for Gear Finishing. Chas. R. Staub. *American Machinist,* v. 92, Sept. 23, 1948, p. 145.

Chart enables the user to select

a stock allowance that is suitable for gears to be shaved at a crossed-axis angle of 10 to 15°.

20a-367. Tables of Corrected Tool Diameters for Non-Top-Rake Circular Tools for Brown & Sharpe Automatics. W. J. Navik. *Screw Machine Engineering,* v. 9, Sept. 1948, p. 25-37.

20a-368. Turret Milling Attachments. C. H. Wummel. *Screw Machine Engineering,* v. 9, Sept. 1948, p. 38-40.

20a-369. Choosing Cams by the Pick-Up Method for Threading Operations. Ernest Fiedler. *Screw Machine Engineering,* v. 9, Sept. 1948, p. 42-43.

Systematic procedure involving calculation and observation in eight steps. Recommended in preference to the usual "cut-and-try" method.

20a-370. Turning Thin-Walled Bushings With a Single-Point Tool. *Machinery* (London), v. 73, Sept. 2, 1948, p. 361-362.

Plastics or metal can be turned down to a wall thickness of 0.005 in. if necessary.

20a-371. Grinding Attachment for Vertical Turret Lathe. *Machinery* (London), v. 73, Sept. 2, 1948, p. 362-363.

20a-372. Fixture for Grinding Punch and Die Inserts for Segmental Stamping. *Machinery* (London), v. 73, Sept. 2, 1948, p. 363.

20a-373. Clamping of Thin-Walled Components. *Machinery* (London), v. 73, Sept. 23, 1948, p. 475. Translated from article by Wildfoerster, *Werkstatt & Betrieb,* v. 81, April 1948, p. 105.

Chucks for use in machining thin-walled components of medium or large diameters.

20a-374. Electronic Lathe Controls Result in Smooth Operation, Sensitivity, Quick Response. Kermit K. Kuck. *Machine and Tool Blue Book,* v. 44, Oct. 1948, p. 123-126, 128, 130-132.

Several types of the above, including one small enough to fit into the base of a lathe.

20a-375. Railroad Axle Lathe With Automatic Electro-Hydraulic Cycle Control and Novel End-Drive Mechanism. Robert Kurzweil. *Electrical Manufacturing,* v. 42, Oct. 1948, p. 134-141.

Piece of equipment which won one of the ten awards in the 1948 *Electrical Manufacturing* Product Design contest.

20a-376. Single Spindle Automatic. Ralph H. Schuman. *Electrical Manufacturing,* v. 42, Oct. 1948, p. 148-155.

Machine tool in which adjustable dogs acting through multiple-limit switches operate magnetic and hydraulic clutches to provide three feed rates or four spindle speeds at any turret face or cross slide in any order. This Warner & Swasey product won one of the 10 awards in the 1948 *Electrical Machinery* Product Design contest.

20a-377. Graphical Representation of the Johansson System of Machining Tolerances. Harold Woodhouse. *Product Engineering,* v. 19, Oct. 1948, p. 169.

20a-378. Electro-Magnetic Form-Copying. *Aircraft Production,* v. 10, Oct. 1948, p. 358-359.

A new copying attachment for lathes, milling machines, planers, and other machine tools.

20a-379. Good Fellows. *Esso Oilways,* v. 15, Oct. 1948, p. 1-8.

Construction and operation of Fellows gear shapers—unique machines which cut gears, racks, segments and other types of toothed elements. History of Fellows Gear Shaper Co., its new $100,000 gear shaper, applications of its products, and their manufacture.

20a-380. Dieheads Will Turn, Form and Groove. C. A. Reimschissel. *American Machinist,* v. 92, Oct. 7, 1948, p. 92-94.

Use of die heads for turning as well as threading. In many instances, they replace box turning tools. Applications cover a variety of work forms: solid shafts, tubular goods, and small forgings.

20a-381. Navy Devises Ingenious Planer and Boring-Mill Setups. Rupert LeGrand. *American Machinist,* v. 92, Oct. 7, 1948, p. 96-100.

Some of the setups used at the Naval Gun Factory, Washington, D.C.

20a-382. Practical Ideas. *American Machinist,* v. 92, Oct. 7, 1948, p. 120-124.

Tapered flat on boring-bar arbor guides boring tool in liner (C. D. Mackinnon); use of spring to absorb shock when shearing heavy stock (Roger Isetts); seam-welding extension mandrel simplifies tube joining (Thomas Kent); sleeve holds heated rollers snug against tapered mandrel (W. S. Ball); fixture for grinding curved surfaces on small parts (Joseph V. Tyler); precision tapping with arbor press (Joe Manius); clamping fixture holds bearing shell for oil-groove machining (Ralph R. Waech); auxiliary nose prevents damage to spindle of surface grinder (Harold W. Cutting); and other miscellaneous shop hints.

20a-383. Motion of the Support as an Auto-Oscillating Process. (In Russian.) L. B. Erlikh. *Stanki i Instrument*

(Tools and Instruments), v. 19, July 1948, p. 4-6.

Assumes that a support moving at slow speed and with considerable friction represents an auto-oscillating system. A theoretical analysis of such a system and application of the results to the improvement of machined surfaces.

20a-384. Geometry of Hard-Alloy Cutting Tools for Automatic Multi-Spindle Machines. (In Russian.) I. M. Neklepaev. *Stanki i Instrument* (Tools and Instruments), v. 19, July 1948, p. 13-14.

New tool shapes proposed on the basis of theoretical calculations. Experiments verified the existence of large advantages as compared with those formerly used.

20a-385. Tangential Cutting Tools of New Design. (In Russian.) S. A. Rubinshtein. *Stanki i Instrument* (Tools and Instruments), v. 19, July 1948, p. 14-16.

Advantages are claimed on the basis of mathematical analysis.

20a-386. Abrupt Change of Stress on Withdrawal of Tools. (In Russian.) V. E. Push. *Stanki i Instrument* (Tools and Instruments), v. 19, June 1948, p. 16-18.

Mathematical analysis, especially applicable to drilling. The stress first increases sharply, then drops off to a minimum value.

20a-387. Centreless Plunge-Grinding; Interesting Developments for Automatic Operation. *Metallurgia,* v. 38, Sept. 1948, p. 285-286.

20a-388. Table of Corrected Tool Diameters for Non Top-Rake Circular Tools: 2¼″ Diameter—3/16″ Offset. Ervin Hodson, Jr. *Screw Machine Engineering,* v. 9, Oct. 1948, p. 28-30.

20a-389. Form Dressing; Translation of Template Contours by Pantograph System. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 347-348; Condensed from *Aircraft Production,* v. 10, July 1948, p. 235-237.

20a-390. Better Production With Gage Block Setups. H. J. Chamberland. *Production Engineering & Management,* v. 22, Oct. 1948, p. 55-58.

Wider use of "B" grade gage blocks for close-tolerance work on surface-grinding setups. Various applications.

20a-391. Precision Surface Grinding Bevel Gear Hub Faces. Roger Isetts. *Production Engineering & Management,* v. 22, Oct. 1948, p. 67-68.

Simple fixture locates the work from the pitch diameter of the gear, assuring consistently uniform vertex measurements when grinding hub faces on pre-cut bevel gears.

20a-392. Useful Hints in Setting up Brown & Sharpe Automatics. Lawrence O. Dirk. *Screw Machine Engineering,* v. 9, Oct. 1948, p. 23-27.

20a-393. Pitfalls to Avoid in Tooling Screw Machines. Part Six. Noel Brindle. *Screw Machine Engineering,* v. 9, Oct. 1948, p. 32-35.

Several styles of standard turning tools and typical part illustrations as an aid in choosing tools for a specific job.

20a-394. Acme-Gridley Model SST-2″ 3″, 6″, Single Spindle Automatics. *Screw Machine Engineering,* v. 9, Oct. 1948, p. 38-40.

20a-395. Tools for Boring Operations. III. A. E. Rylander. *Tool Engineer,* v. 21, Oct. 1948, p. 39-40.

Trend toward precision boring machines.

20a-396. Turning Irregular Contours on a Lathe. Robert Maxant. *Machinery,* v. 55, Oct. 1948, p. 145-151.

Lathe on which various types of multi-sided shapes can be turned, bored, and faced to practically any contour that permits entry of the tool into the cut.

20a-397. Broaching Molds for Rubber Gears. *Machinery,* v. 55, Oct. 1948, p. 151.

Procedure.

20a-398. Broaching of Teeth Speeds Saw Blade Production. *Machinery,* v. 55, Oct. 1948, p. 157-159.

Broaching of over 12 miles of saw blades per day on a single broaching machine. Other applications in producing teeth and similar serrations.

20a-399. Milling Spherical Surfaces Without a Form Tool. *Machinery,* v. 55, Oct. 1948, p. 160.

Use of two-tooth cutter developed by Allis-Chalmers.

20a-400. Sharpening Carbide Tools. Charles H. Wick. *Machinery,* v. 55, Oct. 1948, p. 162-167.

Methods of grinding milling cutters, form tools, reamers, and boring tools; lapping, stoning, storing, handling, and salvage of carbide tools. Last of a series of three articles.

20a-401. Tool Engineering Ideas. *Machinery,* v. 55, Oct. 1948, p. 195-197.

Handy Fixture for Controlling Depth of Milling, Robert Mawson; Safety Device That Insures Protection Against Unguarded Belt, H. Moore; and Air-Operated Milling Fixture for Machining Parallel Surfaces, Harold E. Murphey.

20a-402. Thread-Generating Machine Adapted for Both Threading and Forming. *Machinery,* v. 55, Oct. 1948, p. 199-201.

Machine and typical applications.

20a-403. Set-Ups for Grinding Milling Cutters. *Machinery* (London), v. 73, Oct. 14, 1948, p. 554-558.

Set-ups for sharpening different types of cutters on the Brown & Sharpe No. 5 tool-and-cutter grinding machine.

20a-404. What Makes A Cutting Fluid? Paul Graham. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 86-89, 108.

Cutting-fluid research and various equipment used.

20a-405. The Measurement of Periodic Errors in Gear-Hobbing Machines. C. Timms, A. A. King, and L. E. Jeans. *Engineering,* v. 166, Oct. 8, 1948, p. 337-340.

The original instruments for recording errors have been improved. The latest form of the instrument and its method of use.

20a-406. Practical Ideas. *American Machinist,* v. 92, Oct. 21, 1948, p. 126-130.

Micrometer adapter for accurate measurement of Sharp-V and American Standard screw threads (Charles Shope); setup for cutting threads with 18° taper (K. W. Thompson); rubber pads cushion gang-milling setup on arbor extension (G. R. Milner); pneumatic plunger in turret lathe replaces bar-feed mechanism (Donald E. Eaton); special drill grind for soft sheet metal (H. Scala); setup for threading shouldered studs (Harold W. Cutting); turning collars on the milling machine (L. Deresh); pivoting indicator tool checks vertical angles (Harry Smith); fixture for clamping four jaws simultaneously with one handle (F. W. Duce); set-screw chuck grips odd shapes (Tyler G. Hicks); V-tapered rollers center bars for punching (H. Moore); and other miscellaneous shop hints.

20a-407. Retractable Toolholder for Fine Boring. *Machinery* (London), v. 73, Oct. 7, 1948, p. 524.

20a-408. The Life of Carbide-Tipped Turning Tools. F. F. P. Bisacre and G. H. Bisacre. *Institution of Mechanical Engineers, Proceedings, War Emergency Issue* No. 35, 1947, p. 452-461; discussion, p. 461-469.

In the first part, an adiabatic theory of high-speed metal cutting, with no coolant, is analyzed theoretically. In the second part, a series of experiments made in 1933 on tool life is examined, and a rule is given that accurately correlates the results of these tests. In the final part, results of a study of those properties of the metal cut and of the tool that affect the life of the tool are given.

20a-409. The Priority of Russian Science With Respect to Knowledge Concerning the Mechanism of the Metal-Cutting Process. (In Russian.) S. I. Kashirin and F. A. Barbashov. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 1-6.

An addition to an article published in a previous issue covering the theoretical foundation of the Zvorikin-Briks theory of cutting, published in 1896, on which is based, seemingly, the "new theory" of M. Merchant (1944).

20a-410. Highly Efficient Method for Cutting Trapezoidal Threads. (In Russian.) E. N. Nikitin. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 26-27.

The method and the tools used.

20a-411. Sharpening Formed Milling Cutters With the "Oerlikon" Form and Cutter Grinding Machine, Model FS 21. Charles M. Calame. *Microtecnic* (English Edition), v. 2, Aug. 1948, p. 169-173. Adapted from the French.

20a-412. Grinding Radius-Lipped Tools. *Machinery* (London), v. 73, Oct. 21, 1948, p. 578.

The setup.

20a-413. The Accuracy of Automatic Lathes. D. J. Desmond. *Engineering,* v. 166, Oct. 22, 1948, p. 390-391. A condensation.

The usual quality-control procedure gives an estimate of the inherent variability associated with the manufacture of piece parts on a single-spindle automatic lathe. In many cases, such control charts run out of control, indicating the presence of additional variability depending upon time. A procedure has been designed to determine the magnitude of this effect and analyze it into its constituent parts.

20a-414. Straight Line Indexing. R. A. Schafer and R. Muhl. *Applied Hydraulics,* v. 1, Nov. 1948, p. 6-9.

Functioning of a multiple-operation machine in which a hydraulically operated and electrically controlled straight-line fixture automatically indexes, locates, and clamps a cylinder block progressively through 15 stations.

20a-415. Some Thermal Aspects of Metal Cutting. A. O. Schmidt and J. R. Roubik. *Tool Engineer,* v. 21, Nov. 1948, p. 20-23.

Results of research on the dis-

tribution of heat generated in drilling Dowmetal.

20a-416. Piloted Boring Bars. A. E. Rylander. *Tool Engineer,* v. 21, Nov. 1948, p. 36-37.

Design of bars and pilot bushings, single-point tools for precision, and broached-hole insets.

20a-417. Gadgets. *Tool Engineer,* v. 21, Nov. 1948, p. 38-39.

Piano Wire for Eyelet Machine Needles, Frank Martindell; Precision Combination Case, Robert Mawson; Work Ejector for Drill Press, Paul H. Winter; Milling on the Drill Press, R. Andrews; and Inserted-Tooth Milling Cutter, Carl Bjorklund.

20a-418. Multiple Wheel Grinding Speeds Up Crankshaft Production. Ora F. Mishler. *Machinery,* v. 55, Nov. 1948, p. 162-169.

Main bearings of six-cylinder automotive crankshafts are being finished three times faster than previously by the use of multiple-wheel grinding machines. Bearing diameters are maintained to a tolerance of 0.0005 in. without rough-grinding.

20a-419. The Use and Operation of Single and Multiple Spindle Automatics. Ralph A. Warren. *Machine and Tool Blue Book,* v. 44, Nov. 1948, p. 115-118, 120-122, 124.

A simple form and cut-off job, and one turret-tool operation.

20a-420. How Would You Recondition a 10 x 20 ft. Surface Plate? Rupert Le Grand. *American Machinist,* v. 92, Nov. 4, 1948, p. 92-93.

Methods and equipment used to produce a surface accurate within 0.0003 in. from a plate which was out of level by 0.140 in.

20a-421. Cost-Cutting Milling Setups. Allan F. Clark. *American Machinist,* v. 92, Nov. 4, 1948, p. 94-96.

Factors involved in planning most efficient setups, and how much time and money can thus be saved.

20a-422. Practical Ideas. *American Machinist,* v. 92, Nov. 4, 1948, p. 120-124.

Fixture which centers forged links for drilling (Clifford T. Bower); radius-cutting lathe tool mounted in toolpost (Allan B. Nixon); toolholder for heavy cuts (George W. Wilson); bore-checking gage (Jay M. Clark); indicator on caliper leg for closer reading of inside dimensions (W. A. Dice); block for clamping boring bar (Ray Cafiero); lathe mount for torch cutting rectangular shapes (Charles Homewood); finishing lead metallographic samples by means of razor blade mounted in lathe (G. R. Milner); and other miscellaneous shop hints.

20a-423. Kellering Speeds Part Duplication. Walter G. Patton. *Iron Age,* v. 162, Nov. 4, 1948, p. 102-105.

The Keller machine is basically a duplicating milling machine. For making limited numbers of parts, especially of intricate shape, and for production of experimental parts without expensive pattern or die costs, it is recommended from the standpoints of speed and cost. Typical jobs and setups.

20a-424. Economies of Interchangeability in Jigs and Fixtures. Phil Lindhuber. *Iron Age,* v. 162, Nov. 11, 1948, p. 110-113.

Advantages of universal jigs and fixtures, so designed that they can be easily and quickly changed over to suit a large number of similar parts for machining, and typical fixtures of this type.

20a-425. How to Sharpen Carbide-Tipped Hobs. *Steel,* v. 123, Nov. 15, 1948, p. 95-96, 137, 140, 142.

Equipment for the job, handling of carbides, selection of wheels, feeds and speeds, methods of truing, dressing, and inspecting.

20a-426. Permissible Limits and Measurement of the Roughness of Machined Surfaces. P. E. Dyachenko. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 385-387. Translated and condensed from *Stanki i Instruments* (Machine Tools and Instruments), no. 9, 1947, p. 17-20.

Experiments have shown that the measured surface roughness of machined metal is usually rather different from that which may be expected from calculations based on the shape of the tool used for machining. The measure of irregularity as a function of the cutting speed and the feed. The limits of the various ranges in which the roughness characteristics differ from each other. Calculated formulas for determining the measure of roughness.

20a-427. Tool Engineering Ideas. *Machinery,* v. 55, Nov. 1948, p. 219-222.

Fixture for Drilling Spindle Rails of Various Lengths, Harold E. Murphey; Increasing the Capacity of a Lathe Chuck, John Meyer; Gage for Determining End Diameters of Tapered Holes, H. Moore; Reciprocating Head for Auxiliary Operations on Milling Machines, D. E. McDonald and Fred Shrier; and Lever-Operated Adjustable-Stroke Heavy-Duty Cutter, Edward Diskavich.

20a-428. Theory and Practice of the Crush-Dressing Operation on Grinding Wheels. E. C. Helfrich. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 885-889; discussion, p. 889-891.

A qualitative analysis of the crush-dressing process based upon experimental evidence. The theory developed accounts for the forces involved, power requirements, rate of wheel removal, effect of wheel and crusher diameters, and surface speed on the crushing process. Advantages and disadvantages of crush-dressing vs. diamond-truing.

20a-429. Tooling the Automatic for Volume Production. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 22-26.

Complete details of setup for production of a multiple-use automotive product used in exceedingly large quantities.

20a-430. Pitfalls to Avoid in Tooling Screw Machines. Part Seven. Noel Brindle. *Screw Machine Engineering.* v. 10, Nov. 1948, p. 28-31.

Five additional styles of end turning tools which are widely used on the automatic screw machine. Each tool is assigned to a job to which it is best suited. Recommendations and limitations regarding the extent to which each tool can profitably be applied.

20a-431. Interchangeable Male Plug Gages. Pennell H. Embleton. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 33-34.

Method of manufacturing interchangeable plug gages showing how the screw-machine department may more easily acquire a wide range of gages, yet manufacture the plug gage blanks and handles.

20a-432. Table of Corrected Tool Diameters for Non Top-Rake Circular Tools: 3½" Diameter—¼" Offset. Ervin Hodson, Jr. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 36-39.

Includes explanation of use.

20a-433. Practical Ideas. *American Machinist.* v. 92, Nov. 18, 1948, p. 127-130.

Pantograph-leg linkage adapts special compass for blueprint work (Clifford T. Bower); reverse reamer transfers blind the holes to frame (Thomas Patell); scale tool locates bolt circle (Harold W. Cutting); goose-neck cutter planes curved surfaces (G. R. Milner); table of constants for use in making accurate form tools for V-belt pulleys (D. E. Sweet); bender for cold reduction of tubing (S. Framurz); use of European-type punch guides to simplify die making (Federico Strasser); and other miscellaneous shop hints.

20a-434. New Principle for Tough Cuts. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 110-111.

Tyler band saw and its application to the production cutting of intricate designs in sheet metal. The spiral bandsaw blade has a continuous cutting edge no matter from which direction the work approaches it.

20a-435. Synthetic Sapphires Provide High Finish for Machine Parts. N. Bruce Bagger. *Materials & Methods,* v. 28, Nov. 1948, p. 79.

Use as wearing, bearing, or cutting materials.

20a-436. Master Turbine-Impellers. *Aircraft Production,* v. 10, Nov. 1948, p. 363-364.

Production of patterns for profile copying of impeller vanes.

20a-437. Machine Set-Ups Demonstrated at Olympia. *Machinery* (London), v. 73, Nov. 4, 1948, p. 631-637.

Details of some of the set-ups on single-spindle automatics demonstrated at show, together with information concerning demonstrations on other types of machine tools.

20a-438. Broaching Pinion Cage Slots. *Iron Age,* v. 162, Nov. 25, 1948, p. 88.

How to rapidly machine a number of large slots in pinion cages, holding slot faces to within 0.001 in. of parallel with faces of the pinion cages.

20a-439. Master Bases Cut Fixture Costs. Herman Goldberg. *American Machinist,* v. 92, Dec. 2, 1948, p. 83-90.

Use of standard master bases upon which a wide variety of jigs can be created. These are obtainable in both cam-lock and air-operated models, vertical or horizontal indexing, upward or downward clamping, horizontal clamping, or vise-type.

20a-440. Simplified Machining Produces Complicated Parts. Stone E. Eklund and Aaron H. Shum. *American Machinist,* v. 92, Dec. 2, 1948, p. 96-99.

Use of electrical follower attachments on standard machines simplifies machining operations on compound-angle surfaces.

20a-441. Talented Tooling. *American Machinist,* v. 92, Dec. 2, 1948, p. 100-101.

Manufacturing lathes turn precision steel housing, gear housings bored on angle-plate setup, and free ring controls depth of hand-miller chamfer.

20a-442. Practical Ideas. *American Machinist,* v. 92, Dec. 2, 1948, p. 102-106.

Includes the following: adjustable grinding wheel segments maintain constant diameter in grinding face cams (G. R. Milner); use of three equal-diameter disks for angle layout (S. Framurz); boring-mill fixture sets-up die inserts for arc cut; continuous spinning of 10-qt. pans—loading and unloading while lathe is running at full speed (Rex May, Jr.); aligning fixture for locating milling spindles directly over shaft centers (Ernest F. Abel); use of vernier caliper to measure radii of partial sections (Clifford T. Bower); discussion of adapter method suggested by Charles Shope for measuring thread diameters (Carl A. Johnson); slotting as a substitute for broaching in the end of boring bars (Roger Isetts); and other miscellaneous shop hints.

20a-443. Holders for Dovetail Forming Tools. *American Machinist,* v. 92, Dec. 2, 1948, p. 119.

20a-444. Blanks for Dovetail Forming Tools. *American Machinist,* v. 92, Dec. 2, 1948, p. 121.

20a-445. The Application of Electronics to Machine Tools. *Machinery* (London,) Nov. 11, 1948, p. 663-668.

Some examples displayed at recent British show.

20a-446. Manufacture of Braid Machine Spools. A. Schofield. *Machinery* (London), Nov. 11, 1948, p. 668.

Machining setup.

20a-447. Making Photographic Film Reels. *Machinery* (London), Nov. 11, 1948, p. 669-672.

Methods used by Kodak, Ltd., for one of the several types required.

20a-448. A Work Driver for Lathes. *Engineer,* v. 186, Nov. 12, 1948, p. 500.

Device for gripping and driving centered rough round blanks or turned parts on lathes.

20a-449. Grinding Fine-Pitch Gears. A. S. Beam. *Machinery,* v. 55, Dec. 1948, p. 156-159.

Two principal methods: form grinding and generation by grinding, their distinguishing limitations, and characteristics. Grinding gears of toolsteel, mild steel, stainless steel, iron, aluminum, bronze, brass, Micarta, and other compounded materials.

20a-450. Cutting Sprockets for Silent Chain Drives With One Pair of Cutters. J. L. Jessup. *Machinery,* v. 55, Dec. 1948, p. 166-168.

Details of development of cutter design, including table of data necessary for constructing a cutter to machine sprockets having 13-125 teeth and a pitch of 3/8-0.9 in. The data are intended for use on emergency jobs only, not for mass production.

20a-451. How to Specify Magnetic Chucks. Charles D. Briggs. *Machinery,* v. 55, Dec. 1948, p. 171-174.

Construction, operation, and application of the principal types.

20a-452. Cleaning System Speeds Output of Precision-Built Racing Motors. H. R. Kingsley. *Machinery,* v. 55, Dec. 1948, p. 182-183.

Equipment and methods for cleaning precision-built parts after machining.

20a-453. Tool Engineering Ideas. *Machinery,* v. 55, Dec. 1948, p. 189-192.

Fixture Designed for Radial and Axial Location, F. Server; Sawing Attachment for Cutting off Wedge-Shaped Washers on B & S Automatic, John J. McNeff; and Progressive Die for Producing Two Parts of Similar Design, Federico Strasser.

20a-454. Effects of Cutting Fluids and Power Requirements in Metal Cutting Operations. A. O. Schmidt and G. V. B. Sirotkin. *Lubrication Engineering,* v. 4, Dec. 1948, p. 261-265; discussion, p. 265.

Method and apparatus used to determine the effects of a series of cutting fluids during drilling and milling of steel. A calorimetric method was used to determine the amount of heat generated.

20a-455. "How Would You Tool This Part. H. C. Tsien. *Tool & Die Journal,* v. 14, Dec. 1948, p. 42-45, 70.

Detailed description and drawings of tooling for machining piece known as "stud for clutch lever". Project calls for machining two parts, both having one end eccentric to the other.

20a-456. Construction and Operation of a 3-Spindle Automatic Lathe. E. P. Bullard, III. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 115-120, 122.

20a-457. Automatic Loading Devices for Gear Finishing. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 177-180.

Devices made to suit different production requirements.

20a-458. Jig for Accurate Part Duplication. Robert Mawson. *Iron Age,* v. 162, Dec. 9, 1948, p. 102-104.

Jig designed for accurate location and positive holding in drilling of milling-machine motor-plate keys.

20a-459. Trepan Boring of Deep Holes. W. Iwascheff and E. Schönberg. *Ma-*

chinery (London), v. 73, Nov. 18, 1948, p. 701-702.

The difficulties associated with the drilling of deep holes by conventional means led to investigation of the possibilities of trepan-boring, whereby an annular cut is taken leaving a solid core which is finally removed intact. Method and equipment.

20a-460. Toolholder With Spring Support. *Machinery* (London), v. 73, Nov. 18, 1948, p. 702. Translated from *Techn. Rundschau,* Feb. 5, 1948.

20a-461. High-Production Rolling of Precision Threads. *Machinery* (London), v. 73, Nov. 18, 1948, p. 705-706.

New design of thread and form-rolling machine recently developed in the U. S. for production of fine, coarse, square, Acme, or ball-bearing type threads on plain carbon steel; high-carbon, high-Cr alloy steel; high speed steel; brass; aluminum; or bronze. In addition, knurling, burnishing, serrating, and other form-rolling operations can be done.

20a-462. Fixture for Turning Split Bearings. *Machinery* (London), v. 73, Nov. 18, 1948, p. 710. Translated from *Tech. Rundschau,* v. 4, July 30, 1948, p. 5.

20a-463. Practical Problems of Machinability. Chester M. Inman. *Metals Review,* v. 21, Dec. 1948, p. 41, 43, 45.

First portion of Lecture III on "The Working of Steel" is confined mainly to those variables in internal mechanical structures obtainable in steel, and variations in cutting angles, both of which combine to determine actual machining characteristics for a given operation.

20a-464. The Crib. *Production Engineering & Management,* v. 22, Dec. 1948, p. 73.

Device for Tapping Holes, W. M. Goodrich; Edge Locating Fixture, J. G. Betz; and Screw Machine Slotting, J. Harry Hill.

20a-465. Air and Hydraulic Clamping for Jigs and Fixtures. Harry L. Stewart. *Tool Engineer,* v. 21, Dec. 1948, p. 25-28.

Automatic clamping cuts costs and speeds production with reduced operator fatigue.

20a-466. Piston Pin Hole Production. A. Francis Townsend. *Tool Engineer,* v. 21, Dec. 1948, p. 29-30.

Improved method and equipment.

20a-467. Internal Cooling of Grinding Wheels. Alexander Maxwell. *Tool Engineer,* v. 21, Dec. 1948, p. 31.

20a-468. Precision Boring Tool Design, V. A. E. Rylander. *Tool Engineer,* v. 21, Dec. 1948, p. 38-39.

Deals with precision boring, such as finishing operations which require no further processing except possibly honing or lapping.

20a-469. Gadgets. *Tool Engineer,* v. 21, Dec. 1948, p. 40-41.

Automatic Two-Position Stop (for milling machine), E. H. Kinne; An Improved Cam Movement, Robert Mawson; and Emergency "Hard" Drill (uses hard-facing of ordinary drill), James Maltby.

20a-470. Problems in Shaving Fine-Pitch Gears. Louis D. Martin. *American Machinist,* v. 92, Dec. 16, 1948, p. 84-88.

Shaving of fine-pitch spur and helical gears. Materials range from toolsteel to nylon; jobs run the gamut of type and size.

20a-471. A Handbook of Horizontal Broaching Fixtures. Ben C. Brosheer. *American Machinist,* v. 92, Dec. 16, 1948, p. 93-108.

Equipment, procedures and applications.

20a-472. Radials Cut Boring Costs 24.3%. *American Machinist,* v. 92, Dec. 16, 1948, p. 109-111.

Combined boring with drilling, tapping, and facing on four injection-molder parts. Other production jobs.

20a-473. Practical Ideas. *American Machinist,* v. 92, Dec. 16, 1948, p. 120-124.

Precision centering fixture for cylindrical grinding without a cylindrical grinder (Allan B. Nixon); wheel fixture gages tapers (H. Moore); ammeter load gage indicates machine-tool condition and safe load limit (Chandler A. Phillips); fixture for holding lamination assemblies during welding (T. E. Tyler); eccentric pins level work on cylinder grinder (Harold W. Cutting); carbide bit with four edges (Walter Dimitruk); midget vise for small die work (Clifford T. Bower); and other miscellaneous shop hints.

20b—Ferrous

20b-1. Effects of Grinding on Physical Properties of Hardened Steel Parts. Howard E. Boyer. *Steel Processing,* v. 33, Dec. 1947, p. 738-741, 760.

Previously abstracted from American Society for Metals Preprint No. 23, 1947. See 20-461, R.M.L., v. 4, 1947.

20b-2. Railroad Car Axles Machined Automatically. Walter G. Patton. *Iron Age,* v. 161, Jan. 8, 1948, p. 63-65.

A completely automatic transfer-type machine designed to crop, shear, machine, and face railroad car axle ends. Transfer, positioning, and clamping of the axles automatically.

20b-3. Planer Makes Helical Cuts. George Lalak. *American Machinist,* v. 92, Jan. 15, 1948, p. 93.

Method and equipment used to machine a profile on the edges of 12 blades welded to the outside in a 30° helix.

20b-4. Automatic Machines Speed Truck-Axle Production. Chester S. Ricker. *American Machinist,* v. 92, Jan. 15, 1948, p. 94-96.

Use of specially designed transfer machine in production of heavy-duty, 6-ton truck rear axles, for drilling, countersinking and tapping; also two new boring and facing machines.

20b-5. Band Saw Blading Now Capable of Cutting 200 Basic Materials and Their Derivatives. H. J. Chamberland. *Steel,* v. 122, Jan. 19, 1948, p. 66-67, 104.

The various types and their applications.

20b-6. Producing the New Studebaker. George E. Westphal. *Machinery,* v. 54, Jan. 1948, p. 139-145.

Machining and heat treating equipment and operations in production of engines and other related parts.

20b-7. Attachment for Turning Rudder Shafts. Joseph Clement and J. A. Kruse. *Machinery,* v. 54, Jan. 1948, p. 168.

20b-8. Production Rate on Axle Housings Boosted. *Production Engineering & Management,* v. 21, Jan. 1948, p. 50.

New special-purpose machine tool which has made possible a noteworthy saving in machining time for banjo-type automotive rear-axle housings.

20b-9. Combination Rotary Boring and Recessing Attachments. *Screw Machine Engineering,* v. 9, Jan. 1948, p. 32-36.

Substitution of an 8-spindle automatic for two 6-spindle machines in production of diagrammed part. Slight modification without loss of quality also increases production by 42 pieces per hr.

20b-10. Machining Operations on Knitting Machine Components. *Machinery* (London), v. 72, Jan. 8, 1948, p. 35-42.

Methods and equipment used by a British firm.

20b-11. Ford Retools Cylinder Block Line With Transfer Machines. *Automotive Industries,* v. 98, Feb. 1, 1948, p. 38-39, 81.

20b-12. Cast Iron Gear-Shaving Increased 83%. *Steel,* v. 122, Feb. 9, 1948, p. 102.

How over 1500 crankshaft timing gears are processed each 8-hr. period per operator in Ford's Rouge plant by combining two high-production underpass machines with semi-automatic, air-operated loading.

20b-13. High-Speed Machining of Rear-Axle Housings on a "Transfer-matic". *Machinery,* v. 54, Feb. 1948, p. 161-164.

Production of automotive rear-axle housings on completely automatic transfer-type equipment; 20 housings are in the unit at one time, two housings being machined simultaneously at each station.

20b-14. Broaching Mating Parts on One Machine. *Machinery,* v. 54, Feb. 1948, p. 170-171.

Application to machining of tractor-wheel hub and hub clamp.

20b-15. Needle Bearing Stabilizers Maintain Alignment. *Product Engineering,* v. 19, Feb. 1948, p. 104-105.

Use on hydraulic surface grinders.

20b-16. Drill Jigs Speed Output of Stove Burners. Walter Rudolph. *American Machinist,* v. 92, Feb. 12, 1948, p. 124-125.

By fixturizing many of its drill-press operations, Odin Stove Co. has more than doubled productive capacity and efficiency of the drilling department. The oven and top burners are gang-drilled with special mechanisms.

20b-17. Speeds and Feeds for Boring. *American Machinist,* v. 92, Feb. 12, 1948, p. 149.

Tables for steel and cast iron.

20b-18. Huge Lathe Speeds Turning of Diesel Crankshafts. *Tool Engineer,* v. 20, Feb. 1948, p. 25.

One of two lathes, each 45 ft. long, recently installed at Superior Engine Division of National Supply Co., Springfield, Ohio.

20b-19. Concealed Cost in the Chip Pile. H. J. Chamberland. *Production Engineering & Management,* v. 21, Feb. 1948, p. 69-71.

Worthwhile material savings can be effected in the processing of steel by utilizing contour sawing for removing the stock en masse, thus reducing amount of chip formation.

20b-20. Cutting an Increasing Twist in Gun Rifling. G. Tonn. *Machinery* (London), v. 72, Jan. 22, 1948, p. 118.

Machine-tool mechanism for the above process.

20b-21. Honing Diesel Cylinder Liners. E. D. Ball. *Machinery* (London), v. 72, Jan. 29, 1948, p. 131-134.

Special equipment used by British firm.

20b-22. New Techniques in Conditioning Stainless Steel. A. E. Hamilton, Jr.

Iron and Steel Engineer, v. 25, Feb. 1948, p. 78-84; discussion, p. 85-87.

Use of new machines which have been developed for grinding slabs and strip. They offer possibilities for better quality and production at lower costs. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 22, 1947.)

20b-23. Broaching Gasket Faces on Chevrolet Engine Blocks. *Iron Age,* v. 161, Feb. 19, 1948, p. 71.

More efficient method which replaced grinding.

20b-24. The Production of Oil-Engined Locomotives. *Machinery* (London), v. 72, Feb. 5, 1948, p. 167-174.

Methods used by British firm, mainly for machining.

20b-25. Cemented Carbide Milling Cutters and Their Applications. H. Eckersley. *Machinery* (London) v. 72, Feb. 5, 1948, p. 175-180, 192.

20b-26. Portable Gear-Tooth Grinder. *Railway Mechanical Engineer,* v. 122, March 1948, p. 82-83.

Equipment used primarily for removing shoulders on worn traction-motor ring gears at the West Burlington Diesel shop of the Chicago, Burlington & Quincy.

20b-27. Ingenious Tooling Cuts Sheave Costs. Carl Shank. *American Machinist,* v. 92, March 11, 1948, p. 178-181.

Taper-lock sheaves are made in 467 stock sizes by Dodge for various V-belt applications. Tooling arrangements for their economical production.

20b-28. The Manufacture of Injectors for High-Speed Oil Engines. *Machinery* (London), v. 72, Feb. 26, 1948, p. 267-272.

Methods used by British firm. Details of injector designs.

20b-29. Chicago, Burlington & Quincy Diesel Crankshaft Repairs. *Railway Mechanical Engineer,* v. 122, March 1948, p. 67-71.

Combination crankshaft and axle-grinding machine and other equipment used in the shop, and their operation.

20b-30. Gear Specialists. *Western Machinery and Steel World,* v. 39, March 1948, p. 93-95.

Production of gears by Advance Gear Machine Corp., Southern California. Machining and heat-treating operations.

20b-31. The Production of Fuel Pumps for High-Speed Oil Engines. *Machinery* (London), v. 72, March 4, 1948, p. 299-303.

Details of methods used by a British firm.

20b-32. Profile Milling Applied to Accurate Roll Pod Machining. Donald M. Laflin. *Steel,* v. 122, March 29, 1948, p. 72-77, 98.

New machining method centers around use of a specially designed roll holding fixture on a floor-type Giddings & Lewis horizontal boring, drilling, and milling machine equipped with a synchronized, dual, hydraulic, tracer-control attachment. Tungsten-carbide cutters remove metal in roughing operations. Contour milling with a sectional slab mill then gives required accuracy and final finish.

20b-33. New Tools, Close Accuracy Produce Mining, Construction, Oil Equipment. Gerald Eldridge Stedman. *Machine and Tool Blue Book,* v. 44, April 1948, p. 167-168, 170, 172, 174, 176.

Machine-shop equipment and procedures at Gardner-Denver Co., Denver, Colo.

20b-34. Free-Cutting Stainless Steel Castings. *Foundry Trade Journal,* v. 84, March 18, 1948, p. 277.

Limitations of special machining techniques and application to cast products.

20b-35. Machining Coil Slots in Small Stators. *Machinery* (London), v. 72, March 18, 1948, p. 367-368.

Jigs, fixtures, and workholders for production of mild-steel stators.

20b-36. Automatic Broaching Speeds Output of Auto Window Pinions by Pushing Work Through Tool. Herbert Chase. *Steel,* v. 122, April 12, 1948, p. 89.

Method used for production of small steel pinions.

20b-37. 12-Foot Pit as Tooling Help. *Western Machinery and Steel World,* v. 39, April 1948, p. 81.

Use in manufacture of stainless-steel rocket motors.

20b-38. Surface Broaching Cylinder Block Castings. *Machinery* (London), v. 72, April 8, 1948, p. 447-454.

Special machines at British firm.

20b-39. Crosley Motor's New Cobra Engine Is Made of Steel Stampings, Copper Hydrogen Brazed Together. H. E. Brazier. *Machine and Tool Blue Book,* v. 44, May 1948, p. 133-138.

Parts are copper hydrogen-brazed at 150 spots. A minimum of machining operations are used. However, machining operations are stressed in this article.

20b-40. Hydraulic Honing Device for Aero Engine Production. *Industrial Diamond Review,* v. 8, April 1948, p. 116-117.

20b-41. Drill Grinding. Harold C. Reading. *Aircraft Production,* v. 10, May 1948, p. 172-174.

Pointers on obtaining greater efficiency, use of drill gage for checking angularity of the cutting edges and centrality of the point.

20b-42. Making the Dynaflow—An Exacting Precision Job. Joseph Geschelin. *Automotive Industries,* v. 98, May 15, 1948, p. 26-28, 88, 91.

Production of new Buick transmission. A sampling of the many metal-cutting operations involved.

20b-43. Motors for Farms. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 39, May 1948, p. 66-69, 102-103, 110.

Production of four-cycle, single-cylinder, air-cooled engines mainly for farm use. Machining operations.

20b-44. Packard Transfer Line Machines 50 Blocks an Hour. Thomas E. Lloyd. *Iron Age,* v. 161, May 20, 1948, p. 72-79.

The machines and the production line are designed to permit subsequent changes in engine design by modifying present fixtures and acquiring new drill heads. Work sequences and operations.

20b-45. Slideway Grinding. Arthur Schrivener, *Machinery* (London), v. 72, May 6, 1948, p. 566-568.

Pros and cons of peripheral-wheel grinding, cup-wheel grinding, and profiled cup-wheel grinding for the slideways of machine tools.

20b-46. Economy Factors in Carbide Milling. A. O. Schmidt. *Iron Age,* v. 161, May 27, 1948, p. 72-77.

Extensive tests on three types of carbide face mills stress the importance of such factors as work rigidity, cutter feeds and speeds, work-piece hardness, carbide grade, and machine load.

20b-47. Drilling 43-Inch Diesel Camshafts With Carbide-Tipped Drills. Fred W. Lucht. *Machine and Tool Blue Book,* v. 44, June 1948, p. 139-146, 148.

The design and application of "all depth" carbide drills and their application in drilling camshafts.

20b-48. Machining 65-Ton Nickel-Chromium Steel. *Machinery,* (London), v. 72, May 13, 1948, p. 599.

Some examples of 65-ton nickel-steel components machined with tungsten carbide. Considerable savings that have been effected in operating times and tool costs by the correct application of suitable grades of tungsten carbide as compared with the use of high speed steel tools.

20b-49. Machining Cast Iron Frames for Mines Locomotives. *Machinery,* (London), v. 72, May 20, 1948, p. 615-621.

Methods used by British firm.

20b-50. The ABC of Grinding Machine Tool Slideways. R. E. Andrews. *Tool Engineer,* v. 20, June 1948, p. 30.

Profiled cup-wheel grinding insures accurate fit of mating dovetail slides.

20b-51. Recommended Procedure for Bandsawing Mild Steel Mouldings. *Machinery* (London), v. 72, June 3, 1948, p. 681-682.

Technique for various shapes of steel moldings.

20b-52. Huge Grinder in Portland Plant. *Western Machinery and Steel World,* v. 39, June 1948, p. 97.

Hanchett surface grinder has a 48-in. segmental wheel and a 20-ft. traveling table. Use on large items.

20b-53. Fifteen-Second Shave Produces Distributor Shaft Drive Gears. *Steel,* v. 122, June 28, 1948, p. 103.

Semiautomatic underpass shaving machines turn out one finished gear every 15 sec.

20b-54. High-Speed Milling of Threads in Armor Plate. *Machinery,* v. 54, July 1948, p. 190-192.

With new attachment, a single operation now replaces the seven previously required and a thread can be milled in about 2 min. as compared with 30 min.

20b-55. Output of Meehanite Gears Speeded by Special Methods. Gerald Eldridge Stedman. *Production Engineering & Management,* v. 22, July 1948, p. 44-47.

Processing of Meehanite iron worms and gears for heavy-duty worm-gear drives.

20b-56. Automatic Wheel Machining. *Railway Mechanical Engineer,* v. 122, July 1948, p. 65-69.

Boston & Maine utilizes a 54-in. Bullard Man-Au-Trol for machining three sizes of diesel locomotive wheels at three times the former output.

20b-57. Lapping AB Slide Valves. *Railway Mechanical Engineer,* v. 122, July 1948, p. 81-82.

Device by which the average mechanic can produce a straight level surface with virtually no risk of rounded ends or sides in the finished seat.

20b-58. Connecting Rod Machining Time and Cost Cut 20 Per Cent by Careful Utilization of Equipment and Shop Area. *Steel,* v. 123, Aug. 2, 1948, p. 84-86.

Methods, equipment and layout.

20b-59. Progress Report No. 1 on Tool-Chip Interface Temperatures. K. J. Trigger. *Transactions of the American Society of Mechanical Engineers,* v. 70, Feb. 1948, p. 91-98.

Some of the results of a series of experiments on the temperature developed at the contacting surface of the tool and the chip. This tool-chip interface temperature is referred to as the "cutting" temperature. Determination was by means of the Herbert-Gottwein tool-work thermocouple in which the steel workpiece constitutes one member of a thermocouple and the cemented-carbide insert the other member.

20b-60. Special Tools Bore Aluminum Castings at High Speed. Ben C. Brosheer. *American Machinist,* v. 92, Aug. 12, 1948, p. 90-92.

A continuous cut at nearly 3400 f.p.m. for contour-boring the inside of pressure cookers. Special tools and chuck which make this possible.

20b-61. High-Speed Planing With Carbide Tools. W. P. Coomey. *Machinery,* v. 54, Aug. 1948, p. 141-146.

Carbide tools of improved design permit planing of semi-steel castings at speeds up to 300 ft. per minute with feeds of from 3/64 to ⅛ in. and depths of cut up to 1 in.

20b-62. High Speed Planing with Carbide Tools. *Machinery* (London), v. 73, Aug. 12, 1948, p. 170.

The successive steps in a systematic investigation of the causes of tool failure and their elimination, resulting in the obtaining of speeds of 240 to 310 ft. per. min., with depths of cut, on semisteel castings, of 1/4 to 1 in. and feeds from 0.045 to 0.125 in.

20b-63. Shear Cutting Speeds Production of Motor Shafts. P. H. Foley and H. L. Seekins. *Machine and Tool Blue Book,* v. 44, Sept. 1948, p. 121-122, 124, 126, 128, 130.

In the shear-cut process, the shaft being machined is revolved slowly, while a formed broach is fed across the shaft on a tangent line.

20b-64. Lathe Facing Fixture Jumps Percentage of Production Time. Robert Mawson. *Steel,* v. 123, Sept. 6, 1948, p. 122.

How single-motion holding action reduces nonproductive time to a minimum, locates parts accurately and holds them rigidly in production of cast-iron traverse-bar lever driver used in textile machines.

20b-65. Friction Circular Sawing. *American Machinist,* v. 92, Sept. 9, 1948, p. 141, 143.

Process, and numerical data for ferrous metals.

20b-66. Tooling for High Production on Automatic Grinding Machines. *Machinery,* v. 55, Sept. 1948, p. 158-162.

Methods used in setting up "consta-contac" high-speed automatic grinding machines for production of ball and roller bearing races, automotive-engine valves, valve seats, pistons, and cast socket wrenches.

20b-67. Advanced Machining and Welding Methods in a Car-Building Shop. *Machinery,* v. 55, Sept. 1948, p. 163-165.

Car-wheel boring machines with rotating tools, hydraulic lathes that simultaneously rough- and finish-turn axles, and a huge spot welder are among the new machine tools developed by Pullman-Standard.

20b-68. Planing Cast Iron With Carbide Tools. George J. Raible. *Machinery,* v. 55, Sept. 1948, p. 171-173.

Recommended methods.

20b-69. Making Micrometer Dials for Machine Tools. George Black. *Machinery,* v. 55, Sept. 1948, p. 189-190.

Specially designed equipment for producing the above from "Stainless W," a Ti-bearing, age hardening, 18-8 stainless steel.

20b-70. Grinding Packard Crankshafts and Camshafts. George W. Deislinger. *Iron Age,* v. 162, Sept. 16, 1948, p. 80-83.

Setup for grinding crankpin and camshaft bearings. An unusual induction-hardening installation is used to harden the bearings and the camshaft gear.

20b-71. Roll Turning With Carbide Tools. F. R. Dinger. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 66-69.

Use in manufacture and servicing of rolling-mill rolls.

20b-72. Basic Reasons for Good Machinability of "Free Machining" Steels. M. Eugene Merchant and Norman Zlatin. *American Society for Metals Preprint* No. 21, 1948, 27 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 647-672; discussion, p. 672-677.

An evaluation is made of the effects of addition of sulphur, of lead, of sodium sulphite, and of cold working, on coefficient of friction between chip and tool, mean shear strength of the metal in cutting,

and machining constant of the metal. The effect of other less basic mechanical properties.

20b-73. Nature and Detection of Grinding Burn in Steel. L. P. Tarasov and C. O. Lundberg. *American Society for Metals, Preprint* No. 44, 1948, 36 pages. *Transactions of American Society for Metals,* v. 41, 1949, p. 893-927; discussion, p. 927-939.

Microstructural and hardness changes that may occur in hardened steel parts when they are burned during grinding, and their response to macroetching. Hardness data and sensitive nondestructive macroetching techniques for detecting hardness changes (and sometimes high stresses) in ground surfaces. These techniques should be useful for inspection and trouble-shooting.

20b-74. High Speed Machining of Large V-8 Cylinder Blocks. Joseph Geschelin. *Automotive Industries,* v. 99, Oct. 1, 1948, p. 32-35.

Self-contained automatic transfer machines play big part in efficient production at Lincoln plant.

20b-75. How Buick Makes Dynaflow Brakes Tough. Chester S. Ricker. *American Machinist,* v. 92, Oct. 7, 1948, p. 118-119.

Brake bands in the Dynaflow transmission are machined from forged rings. Steps in their production.

20b-76. Cutting Conditions for Rapid Machining of Steels. (In Russian.) P. P. Grudov and S. I. Velkov. *Stanki i Instrument* (Tools and Instruments), v. 19, July 1948, p. 7-12.

Optimum conditions for milling machines as obtained by experimental work. Data for different types of steel, cutting tools, and dimensions of the work.

20b-77. Grindability of Steels. (In Russian.) N. I. Volskii. *Stanki i Instrument* (Tools and Instruments), v. 19, July 1948, p. 20-23.

Effects of factors such as composition, structure and heat treatment.

20b-78. Machining Work-Hardening Steels. W. M. Halliday. *Metallurgia,* v. 38, Sept. 1948, p. 254-256.

Means for minimizing the work-hardening effect and methods of dealing with parts which have already been workhardened during earlier operations.

20b-79. Machine Shop Operations in Loom Production; Method Employed at the British Northrop Factory. *Machinery* (London), v. 73, Sept. 30, 1948, p. 491-496.

20b-80. Drilling 18-8 Stainless Steel. James K. Matter. *Tool Engineer,* v. 21, Oct. 1948, p. 29-30.

Recommended procedures and equipment necessary to prevent workhardening.

20b-81. Underpass Method Speeds Gear Shaving. *Production Engineering & Management,* v. 22, Oct. 1948, p. 68.

New method used in production of truck transmission gears.

20b-82. Machining and Assembly Operations on Looms; Methods Employed at the Works of the British Northrop Loom Co., Ltd. *Machinery* (London), v. 73, Oct. 14, 1948, p. 547-553.

20b-83. The Production of Components for Automatic Looms. Operations on Milling Machines, Automatics, and Presses. *Machinery* (London), v. 73, Oct. 7, 1948, p. 519-524.

20b-84. Modern Milling Machines and Cutters for Production. A. O. Schmidt. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 90-93, 106-107.

Results of investigation over a 5-yr. period of high-speed milling and cutter design. Calorimetric-power and cutter-life tests were applied, using specially designed dynamometers.

20b-85. Progress in Turbine Gear Manufacture in Recent Years. A. Sykes. *Institution of Mechanical Engineers, Proceedings,* War Emergency Issue No. 35, 1947, p. 405-417; discussion, p. 432-451.

The hobbing machine still remains the accepted means of cutting high-speed gears, but there is considerable difference of opinion as to whether creep or noncreep machines are superior. Use of master index wheels having a fine pitch and greater accuracy in construction; the process of crossed axis shaving. Experiments with carbide-tipped hobs.

20b-86. Determination of Optimum Back Angle During Operation of Rapid Milling Machines. (In Russian.) M. N. Larin. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 7-11.

A general formula for calculation. This value is independent of rate of cutting, of quality and mechanical properties of the steel and of value of lead angle, within certain limits; and of the method of cutting.

20b-87. Surface Finish: The Influence of Suspended Swarf in Grinding Coolant. Arthur Scrivener. *Microtecnic* (English Edition), v. 2, Aug. 1948, p. 179-181.

Equipment for automatic and con-

tinuous removal from the coolant of the ferrous swarf and broken abrasive grit deposited therein by the action of the grinding wheel.

20b-88. Gear Shaving; High Production Rates on Distributor Shaft Drive Gears. *Automobile Engineer,* v. 38, Oct. 1948, p. 374.

Production in the U. S. at the rate of one finished gear every 15 sec. by means of semi-automatic "underpass" shaving machines.

20b-89. Fuel Injection Equipment; A Survey of the Production Methods Employed by C. A. V. Ltd. (Continued). *Automobile Engineer,* v. 38, Oct. 1948, p. 377-384.

Methods employed in the production of nozzle-body holders, nozzle bodies, and valves. The manner in which multi-spindle automatic machining is used for preliminary operations, and typical automatic machining sequences for each component. Methods employed to produce close dimensional accuracy and high quality surface finishes.

20b-90. Machining Cotton Spinning Spindles; Special Equipment for Centreless Grinding and Turning. *Machinery* (London), v. 73, Oct. 21, 1948, p. 575-578.

20b-91. Outstanding Operations in Producing Kaiser-Frazer Steering Assemblies. John J. Shepp. *Machinery,* v. 55, Nov. 1948, p. 202-207.

Some unusual machining, inspecting, and finishing operations in production of 900 steering assemblies per day.

20b-92. Step-Drilling Machine for Crankshafts. *Product Engineering,* v. 19, Nov. 1948, p. 98-100.

Automatic crankshaft-drilling machines for Ford and Mercury engines.

20b-93. How Tooling Problems Were Decided for Cadillac's New V-Eight Cylinder Block. Harold G. Warner. *Automotive Industries,* v. 99, Nov. 1, 1948, p. 38-39, 86, 88, 90.

Planning of tooling and machining methods.

20b-94. Tool Angles for Machining Meehanite Castings. *American Machinist,* v. 92, Nov. 4, 1948, p. 139.

Recommended tool shapes and angles, including cutting speeds for various grades.

20b-95. An Evaluation of Cylindrical-Grinding Performance. R. E. McKee, R. S. Moore, and O. W. Boston. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 893-900; discussion, p. 900-901.

Third in a series on cylindrical grinding. Results of an investigation of the grinding process with particular reference to the influence of certain variables, such as wheel grain, grade, and velocity; table-traverse feed; depth of cut; and type of material; for three steels and two cast irons.

20b-96. Step by Step in the Manufacture of Cylinder Sleeves. Joseph Geschelin. *Automotive Industries,* v. 99, Nov. 15, 1948, p. 38-39, 96.

Turning out dry liners for diesels.

20b-97. "Tailoring" Buses with Precision Band Saws. H. J. Chamberland. *Automotive Industries,* v. 99, Nov. 15, 1948, p. 40-41, 62, 64.

Various types of specialized band saws used to speed cutting of jigs, templets, body panels, and steel tubing for frames.

20b-98. Carbide Tooling Increases Screw Machine Production Six-Fold. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 32.

Diagrams and test show how a 2-in. diam. part is made from S.A.E. 1020 carbon steel in 14.7 sec. on a 6-spindle automatic screw machine, a production increase of six times that of the previous setup using high speed tools.

20b-99. Motorized Wheelbarrows Roll Through Straight-Line Layout. Arthur Hess. *American Machinist,* v. 92, Nov. 18, 1948, p. 118-119.

Machining setups for production.

20b-100. Grinding Reginald S. Bruce. *Edgar Allan News,* v. 27, Nov. 1948,

Recommended procedures for grinding steel cutting tools.

p. 161-164.

20b-101. Grinding Die Laminates. *Western Machinery and Steel World,* v. 39. Nov. 1948, p. 105.

Grinding of high-chromium, high-carbon lamination dies for motor stators.

20b-102. Machining Firefly Components. J. A. Oates. *Aircraft Production,* v. 10, Nov. 1948, p. 380-387.

Operations on the latchpin attachment fitting for the rear center-section spar and other "difficult" units of British plane.

20b-103. An Unusual Machining Operation on a Printing Cylinder. *Machinery* (London), v. 73, Nov. 4, 1948, p. 638-639.

Set-up for milling curved ribs for printing of curved coordinates on recorder charts.

20b-104. Threading at 2000 R.P.M. With Carbide Tipped Chasers. S. T. Hicks. *Iron Age,* v. 162, Nov. 25, 1948, p. 80-82.

Threading of S.A.E. X1315 steel

studs can be accomplished at machine spindle speeds of 2000 r.p.m. and cutting speeds of 400 s.f.p.m., eliminating the necessity of reducing machine speeds for threading operations.

20b-105. How Harvester Makes Forging Dies. C. R. Hoagland. *American Machinist,* v. 92, Dec. 2, 1948, p. 78-82.

Machining, welding, and other procedures.

20b-106. Dodge Rolls Threads on Screw Machines. Rupert LeGrand. *American Machinist,* v. 92, Dec. 2, 1948, p. 94-95.

How rolled stud fits are held to 0.002 in. on pitch diameter, as compared to 0.0034 in. for die-cut nut fits, and how the part is completed in one operation.

20b-107. Machining Pilger-Type Tube Mill Rolls on a Special Craven Lathe. *Machinery* (London), Nov. 11, 1948, p. 673-674.

20b-108. Planing Cast Iron with Carbide Tools. G. J. Raible. *Machinery* (London), Nov. 11, 1948, p. 675-676.

20b-109. Production of Rock Bits at Reed Roller Bit Company. Gerald Eldridge Stedman. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 125-126, 128, 130-132, 134.

20b-110. Huge Spherical Roller Bearings Made to Close Tolerances. Charles H. Wick. *Machinery,* v. 55, Dec. 1948, p. 139-146.

Spherical roller bearings as large as 48 in. in diam. and weighing more than 5100 lb. are manufactured with toolroom precision.

20b-111. High-Speed Boring and Turning Operations. *Machinery,* v. 55, Dec. 1948, p. 146-147.

How 900 hydraulic tappet tubes per hr. are machined externally and internally on a New Britain precision boring and turning machine equipped with magazines that automatically feed the workpieces to the two heads.

20b-112. Oldsmobile's Modern Facilities for Production of 1949 V-8, Overhead-Valve Engine. Joseph Geschelin. *Automotive Industries,* v. 99, Dec. 1, 1948, p. 30-33, 76, 78.

20b-113. Mill-Broach Speeds V-8 Engine Production. *Iron Age,* v. 162, Dec. 9, 1948, p. 104-105.

New combination machine developed by Cincinnati Milling Machine Co.

20b-114. Boiler Drilling and Tapping Performed by Portable Machine. *Steel.* v. 123, Dec. 13, 1948, p. 103.

20b-115. Broach Manufacture. *Machinery* (London), v. 73, Nov. 18, 1948, p. 695-700.

Operations in the broach div. of B.S.A. Tools, Ltd.

20b-116. How Large Gears Are Shaved. George P. Maurer. *American Machinist,* v. 92, Dec. 16, 1948, p. 90-92.

Diameters and shaft lengths up to 96 in. can be handled on newer machines. Procedure and some problems.

20c—Nonferrous

20c-1. Abrasive Belts for Machining Die Castings. *Die Castings,* v. 6, April 1948, p. 68-70, 72, 74-75.

20c-2. Machining Copper and Its Alloys. Joseph J. McGuinness. *American Machinist,* v. 92, May 6, 1948, p. 101-112.

Latest available data on machining the commonly used Cu and Cu-base alloys. Machinability ratings, tool shapes, specific recommendations, typical applications, corrosion resistance, and similar information based on current practice of major fabricators and suppliers.

20c-3. Fixtures Aid Work Handling. Walter Rudolph. *American Machinist,* v. 92, May 20, 1948, p. 96-97.

Well-planned fixtures and work-handling devices eliminate unnecessary motions.

20c-4. The Machining of Stainless Steels. W. H. Crisp and W. Burnan. *Aircraft Engineering,* v. 20, May 1948, p. 151-153.

Problems peculiar to the machining of Cr and Cr-Ni steels.

20c-5. Combining Slotting and Burning Attachments to Perform Difficult Slotting Operation. Lawrence O. Dirk. *Screw Machine Engineering,* v. 9, June 1948, p. 23-28.

How to produce complex brass part on automatic screw machine.

20c-6. Shop Shots From Stewart Die Casting. *American Machinist,* v. 92, July 1, 1948, p. 108-109.

Machining of miscellaneous die-cast Al and Zn items.

20c-7. Broaching Stamped Parts. *Iron Age,* v. 162, July 15, 1948, p. 88.

Simultaneous broaching of identical telephone-relay parts.

20c-8. Drilling Die Castings. *Die Castings,* v. 6, July 1948, p. 65-66.

Instances in which drilling is more practical than coring. Equipment and procedures for production drilling die-cast parts.

20c-9. Grinding of Beryllium Bronze. Robert Gadeau and Rene Schweyckart. *Microtecnic* (English edition), v. 11, June 1948, p. 104-108. (Translated from the French).

Experimental study using cast beryllium bronze in the quenched, partly hardened, and hardened conditions. Plain cylindrical grinding and screw grinding were applied, the former with a soluble oil as a coolant, and also without coolant (dry grinding). Surface profiles obtained by different methods.

20c-10. Multi-Slide Tooling for Westinghouse Terminal Clips. *Tool & Die Journal,* v. 14, Sept. 1948, p. 70-72, 74, 76.

Production of terminal clips for outdoor watt-hour meter sockets on U. S. Multi-Slide machines. These machines are equipped with a die head, a cut-off slide, and appropriate cutting and forming tools.

20c-11. Carbides Speed Copper Machining. C. R. Morgan. *American Machinist,* v. 92, Oct. 21, 1948, p. 102-103.

How changes in drill and threading-tool design cut cycle time and produce better finishes with reduced tool breakage.

20c-12. Carbide Die Maintenance. Richard Saxton. *Metallurgia,* v. 38, Oct. 1948, p. 314-316.

Maintenance of dies used for cold forming, drawing, and other purposes.

20c-13. Broaching Helical Oil Grooves. *Tool Engineer,* v. 21, Nov. 1948, p. 35.

An application of broaching, in which up to 30 internal 10° helical oil grooves, in connecting-rod piston-pin bushings for diesel engines, are broached at one pass.

20c-14. How to Machine Vitallium. Jesse Sdano. *American Machinist.* v. 92, Nov. 18, 1948, p. 96-98.

Usually considered non-machinable, Vitallium alloys can be successfully drilled and milled with carbide cutters. Test results.

20c-15. Machining High Purity Molybdenum. John Gelok. *Iron Age,* v. 162, Dec. 9, 1948, p. 106-110.

Because of its inherent characteristics, some unusual problems are faced in machining, forming, and joining molybdenum. Some recommended machining practices.

20c-16. Some Factors in Carbide Die Construction. *Tool Engineer,* v. 21, Dec. 1948, p. 30.

Discussion is concerned primarily with the four general steps in the construction of carbide dies, and is based on the building of a simple draw die for the first operation in a deep draw job.

20c-17. Proper Processing Increases Efficiency of Carbide Dies. Paul F. Rehner. *Production Engineering & Management,* v. 22, Dec. 1948, p. 67-69.

Procedures, established by research conducted by Allegheny Ludlum, which provide a guide for obtaining improved results from carbide dies.

20d—Light Metals

20d-1. Band Sawing Aluminum—With and Without Lubricants. H. J. Chamberland. *Modern Metals,* v. 3, Dec. 1947, p. 25-26.

Data on comparative time and costs.

20d-2. Development of a High-Speed Lathe. R. L. Templin. *Machine Design,* v. 20, Jan. 1948, p. 140-142.

Development of a lathe for machining aluminum at surface cutting speeds up to 20,000 ft. per min. Tests on 14S and 14S-T stock and 24S-T plate. (Condensed from paper presented at Annual Meeting of A.S.M.E., Atlantic City, N. J.)

20d-3. Fitting Magnesium Alloy Doors. *Aircraft Production,* v. 10, Jan. 1948, p. 17-18.

Use of special fixtures in drilling cast doors and frames of the Avro Tudor airplane.

20d-4. High-Speed Machining of Aluminum. *Iron Age,* v. 161, Jan. 22, 1948, p. 61.

Results of high-speed cutting tests of 14 S, 14 S-T, and 24 S-T alloys on a specially designed and constructed high-speed turret lathe. Surface cutting speeds up to 20,000 ft. per min., without any cutting or coolant fluids, were achieved and no indication of an upper speed limit was observed.

20d-5. Drilling Aluminum. *Reynolds Metals Technical Advisor,* v. 1, no. 6, p. 1-2.

Recommended procedures.

20d-6. One Machine—Fourteen Operations. *Die Castings,* v. 6, Feb. 1948, p. 60, 62, 64.

Use of Heald Model 322 double-end Bore-Matic with five boring heads and two holding fixtures to perform fourteen operations on a die-cast aluminum outboard-motor gear housing in an automatic cycle, including boring, facing, milling, chamfering.

20d-7. Production of Housings Boosted by Special-Purpose Drill. *Production Engineering & Management,* v. 21, Feb. 1948, p. 60.

Installation of a new special-purpose drill reduced drilling time by 50% in production of cast aluminum housings for lawn mowers.

20d-8. Tooling and Production of the Apex Fold-A-Matic Ironer. Part III. Carl F. Benner. *Tool & Die Journal,* v. 14, April 1948, p. 50-54, 65, 75-79.

Design and use of jigs and fixtures for production of the die-cast aluminum gear case, which involves 15 machining operations. Dimensional checking system. (To be continued.)

20d-9. Couplings From Automatics. *Western Machinery and Steel World,* v. 39, April 1948, p. 78-80.

Production of patented 17 S-T aluminum couplings for water, gas, steam, fluid, or hydraulic lines. Machining operations.

20d-10. Carbide Tooling on the Multiple Spindle Automatic. Gus Carlson. *Screw Machine Engineering,* v. 9, May 1948, p. 37-40.

Details of production of diagrammed part from 1¼-in.-round, free-machining, Al bar stock on the 1¼-in., Model 601, New Britain automatic. This part is typical of screw-machine products that can be produced most efficiently by a combination of heavy tool feeds and high spindle speeds.

20d-11. Cross Slide Single Point Turning Tool Holder. A. F. Parker. *Screw Machine Engineering,* v. 9, May 1948, p. 52-55.

Tooling to produce aluminum dials on the automatic screw machine.

20d-12. Abrasive Belt Machining. H. L. Ramsey. *Modern Metals,* v. 4, May 1948, p. 13-15.

Method of removing metal stock, surfacing, and polishing has made it possible to cut costs appreciably on several aluminum operations and offers added possibilities for removal of burrs, fins, flash, and sprues in aluminum and magnesium plants.

20d-13. Centerless Grinding Problems Solved by Using Nylon Rollers. *Steel,* v. 122, May 31, 1948, p. 85.

Difficulties in centerless grinding of aluminum tubing with belt machinery were alleviated by installing nylon rods. Sheet fiber rests used in the past had a tendency to pick up particles, wear fast, and consequently to mar stock being ground.

20d-14. Methods for Drilling Aluminum. *Production Engineering & Management,* v. 21, June 1948, p. 54.

Recommendations of Reynolds Metals Co.

20d-15. 1-Oz. Binocular Shell Machined to Close Tolerances. Anderson Ashburn. *American Machinist,* v. 92, July 15, 1948, p. 89-91.

Machining 14 surfaces of magnesium housing to provide precision assembly.

20d-16. Tooling the Wright Cyclone Forged Cylinder Head. F. E. Whitacre. *Tool Engineer,* v. 21, July 1948, p. 17-20.

Machining of new aluminum alloy containing 3.5-4.5% Cu, 1.8-2.3% Ni. 1.3-1.8% Mg, 0.45-0.90% Si, and 1.6% maximum impurities.

20d-17. The Broaching of Aluminum and Magnesium. Harry Gotberg. *Light Metal Age,* v. 6, Aug. 1948, p. 12-16, 27.

Equipment, broach design, and machine operation.

20d-18. Obrabeni hliniku a jeho slitin. (Machining of Aluminum and Its Alloys.) Zdenek Zatloukal. *Hutnické Listy,* v. 3, April-May 1948, p. 120-126.

Optimum conditions for machining aluminum and its alloys.

20d-19. Machining Magnesium Motors. Willard W. Harvey. *Western Machinery and Steel World,* v. 39, Aug. 1948, p. 96-99.

Manufacture of a motorized timber saw.

20d-20. How to Machine and Finish Aluminum Alloy Castings. Floyd A. Lewis. *Steel,* v. 123, Sept. 6, 1948, p. 90-94, 142.

Recommendations for type of tool; tool-grinding practices; tool finish; cutting speeds and feeds; cutting compounds; salvage of cuttings; surface and mechanical finishing; sandblasting; chemical and electrochemical finishes; electroplating; and use of paints, lacquers, and enamels.

20d-21. Development of a High-Speed Lathe for Machining Aluminum. R. L. Templin. *Transactions of the American Society of Mechanical Engineers,* v. 70, Oct. 1948, p. 837-846.

Previously abstracted from *Machine Design,* v. 20, Jan. 1948, p. 120-142. See item 20d-2, 1948.

20d-22. Lubrication Extends Band-Saw Life. H. J. Chamberland. *Tool Engineer,* v. 21, Oct. 1948, p. 36-37.

Use of oil-mist lubrication, including diagram and illustrations of equipment. Comparative saw efficiencies and costs of dry vs. lubricated cutting of 17 ST aluminum.

20d-23. Machining Aluminum. *Reynolds Metals Technical Advisor,* v. 1, no. 9, [1948], p. 3-4.

Section I of new series from Reynolds process manual, "Machining Aluminum Alloys". Fundamentals involved. (To be continued.)

SECTION XXI

MISCELLANEOUS FABRICATION

21a—General

21a-1. The Production of Coiled Springs. *Machinery* (London), v. 71, Nov. 13, 1947, p. 535-540.
Manufacturing methods used at Geo. Salter & Co., Ltd.

21a-2. Coiled Spring Production. *Machinery* (London), v. 71, Nov. 27, 1947, p. 591-597.
Automatic production of the lighter types of springs and inspection and quality-control methods.

21a-3. Light Chain Making Equipment Described. *Wire Industry,* v. 14, Dec. 1947, p. 689-690.
Based on B.I.O.S. Report No. 1346 on German industry.

21a-4. West Made Conveyers. Les Meek. *Western Metals,* v. 5, Dec. 1947, p. 20-21.
Manufacture of various specially designed conveyer systems.

21a-5. Handling Spells Economy at Power Saws. Benjamin Melnitsky. *American Machinist,* v. 92, Jan. 1, 1948, p. 74-75.
How delays can often be avoided by planning materials handling to get full production from power saws.

21a-6. Tricky Tooling Cuts Relay Costs. Paul Bonness. *American Machinist,* v. 92, Jan. 1, 1948, p. 93-95.
Use of ingenious tooling and automatic feeding and clamping to convert standard machine tools into high-production equipment in manufacture of Square D thermal-overload relays.

21a-7. Machine Shops Save Time and Labor With Fork-Lift Trucks. Francis A. Westbrook. *Machine and Tool Blue Book,* v. 44, Jan. 1948, p. 141-142, 144-146.
Used at plant of Cleveland Graphite Bronze Co.

21a-8. Compressed Air and Pneumatic Tools Speed Production. D. H. Palmer. *Machine and Tool Blue Book,* v. 44, Jan. 1948, p. 158-159, 162-164.
Use of compressed air and pneumatic power tools at Ryan Aeronautical.

21a-9. Materials Handling a Prime Factor in Ford Tractor Production. Joseph Geschelin. *Automotive Industries,* v. 98, Jan. 1, 1948, p. 36-39, 74.

21a-10. Buick's New Sheet Metal Plant Features Energy Saving Equipment. *Automotive Industries,* v. 98, Jan. 1, 1948, p. 40-41, 64.
New materials-handling equipment.

21a-11. Materials Handling. *Steel,* v. 122, Jan. 5, 1948, p. 249-250, 253-254, 256.
Brief reports on recent developments: Crane Control Development Allows Use of Cheap Power, by F. M. Blum; Materials-Handling Problems Need Management Cooperation, by R. W. Mallick; American Industry Dependent on Capable Materials Handling, by J. W. Wunsch; Continued Demand Seen for Fork Trucks and Stackers, by F. J. Shepard, Jr.; Outlook Promising for Electric Industrial Truck Industry, by C. B. Cook; Trend Toward Standard Units Seen in Industrial Trucks, by D. L. Darnell; Materials Handling—Key Factor in Production Efficiency, by Elmer F. Twyman; Electric Trucks Substitute for Plant Expansion, by C. F. Kells; Unusual Handling Flexibility Offered by Heavy Trailers, by J. C. Farrell; Inefficient Materials Handling Boosts Product Prices, by Wayne Beldon; Greater Emphasis Placed on Materials Handling, by F. E. Moore; Internal Handling Costs Exceed External Transportation Tariffs, by Ezra W. Clark; Difficult Handling Operations Demand Special Accessories, by Lester M. Sears; Conductor Enclosures Available for Existing Overhead Systems, by A. F. Anjeskey; Industrial Trucks Major Factor in Mechanized Handling, by C. E. Eiler; Push-Button Handling Is Contemplated by Industry, by Jervis C. Webb; Trend Toward Larger Blast Furnace Scale Cars, by E. W. Schellentrager; Battery Maintenance Necessary for Best Plant-Truck Output, by George E. Stringfellow; Power Controls Add Flexibility to Heavy Handling Machinery, by Fred L. White.

21a-12. A Planned Handling System Saves Time and Space at Morse Chain. R. O. Erickson. *Modern Machine Shop,* v. 20, Jan. 1948, p. 164-166, 168, 170, 172, 174, 176, 178.

Procedures and equipment used at Morse Chain Co.

21a-13. Modern Equipment at Work. *Modern Machine Shop,* v. 20, Jan. 1948, p. 184, 190, 192, 194, 196.

Progressive Dual Seam Welder Aids Trailer Body Production; Carboloy Swaging Blocks Reduce Wear in Dies at Underwood; Borizing 13 Surfaces Simultaneously; Reducing Costs With Built-Up Bending Die.

21a-14. How to Analyze and Solve Materials Handling Problems. *Factory Management and Maintenance,* v. 106, Jan. 1948, p. 88-98.

Details and work sheets on two techniques: the method of comparative analysis and the principle of group handling.

21a-15. Manufacture of the de Havilland Dove Light Transport. *Aircraft Engineering,* v. 19, Dec. 1947, p. 393-401.

21a-16. Materials Handling. Robert E. Wright. *Industrial and Engineering Chemistry,* v. 40, Jan. 1948, p. 45-48.

Reviews developments of 1947.

21a-17. Compressed Air Used as Major Power Source in Building Conveyers. *Steel,* v. 122, Jan. 19, 1948, p. 80-82.

Numerous miscellaneous uses in plant of Robins Conveyors Division of Hewitt-Robins, Inc.

21a-18. Printed-Circuit Techniques. Cledo Brunetti and Roger W. Curtis. *Proceedings of the I.R.E.,* v. 36, Jan. 1948, p. 121-161.

Circuits are defined as being "printed" when they are produced on an insulated surface by any process. The methods fall in six main classifications: painting; spraying; chemical deposition; vacuum processes; die-stamping; and dusting. 60 ref.

21a-19. Automatic Feeding Devices. Paul H. Winter. *Tool Engineer,* v. 19, Jan. 1948, p. 39-41.

Mechanical feeding of parts substantially reduces machining and assembly costs on large production runs.

21a-20. Gas Turbine Blading. A. T. Colwell and R. E. Cummings. *Aircraft Production,* v 10, Jan. 1948, p. 24-28.

Current American practice in casting, machining, and fastening methods. (Condensed from paper presented to S.A.E.)

21a-21. Palletizing Doubles Warehouse Capacity of Pole-Line Hardware Manufacturer. William W. Hiller. *Steel,* v. 122, Feb. 2, 1948, p. 103, 119.

Materials handling methods used by Oliver Iron & Steel Corp. in handling bolts, nuts, various types of pole-line hardware, and automotive and railroad specialties.

21a-22. New GM Supplier Plant. Joseph Geschelin. *Automotive Industries,* v. 98, Feb. 1, 1948, p. 28-29, 64, 66.

Tells how decentralized unit in Ohio extends scope of parent Syracuse plant in manufacturing hub caps, bumper guards and grilles.

21a-23. The XC-99—Latest of World's Largest Landplanes. Thomas A. Dickinson. *Modern Industrial Press,* v. 10, Jan. 1948, p. 46-48.

Fabrication procedures.

21a-24. Coordinating Materials Handling With the Manufacturing Cycle. S. C. Hoey. *Steel,* v. 122, Feb. 9, 1948, p. 74-75, 106.

Previously abstracted from *Mechanical Engineering,* v. 69, Dec. 1947, p. 1007-1011. See item 25-205, R.M.L., v. 4, 1947.

21a-25. Handling Materials in the Foundry. Carl H. Moeller. *Foundry,* v. 76, Feb. 1948, p. 222-224, 226.

Methods used in several foundries.

21a-26. What Type of Fluid Power Shall I Use? Harry L. Stewart. *Machine and Tool Blue Book,* v. 44, Feb. 1948, p. 133-138, 140

Applications of hydraulic, airdraulic, and air power in industry. Principles governing the selection of a specific type of fluid power to meet a given service requirement.

21a-27. Master Tooling Dock. Frank Charity. *Steel,* v. 122, Feb. 16, 1948, p. 88-89, 124.

Use for various heavy-fabrication jobs.

21a-28. Freight Car Fabrication Fixturized. *American Machinist,* v. 92, Feb. 12, 1948, p. 120-123.

Applications in assembly procedure.

21a-29. Radiator Assembly Cost Cut by Conveyer Installation. Frank M. Scotten. *Production Engineering & Management,* v. 21, Feb. 1948, p. 53-56.

Installation of conveyerized equipment for radiator assembly and rebuilding of the radiator-parts processing line at Ford Motor has resulted in a 50% production increase and a reduction of time per unit.

21a-30. Automatic Brushing Cuts Downtime. *Production Engineering & Management,* v. 21, Feb. 1948, p. 59.

Unique brushing technique for cleaning conveyer chain.

21a-31. Volume Production Methods Speed Output of Jet Engines. *Produc-*

tion Engineering & Management, v. 21, Feb. 1948, p. 61-68.

Improved processes and greater use of special-purpose tools at General Motors' Allison Division are serving to meet an accelerated demand for turbo-jet engines. Includes forging, heat treatment, machining, inspection methods and equipment.

21a-32. Engine Production in Australia. D. O. MacFarlane. *Aircraft Production,* v. 10, Feb. 1948, p. 57-61.

Miscellaneous technical problems encountered and progress in war and peace. (Presented to Australasian branch of the Royal Aeronautical Society, Sydney.)

21a-33. Introduction to Plant Layout. Parts I and II. A. E. Rylander. *Tool Engineer,* v. 19, Jan. 1948, p. 17-24; v. 20, Feb. 1948, p. 31-36.

First of series discusses the subject in general terms. Second part describes, diagrams, and discusses the layout of a plant for the manufacture of insulated wire and cable, in order to illustrate the principles set forth in Part I. (To be continued.)

21a-34. Printed Circuit Techniques. Cledo Brunetti and Roger W. Curtis. *National Bureau of Standards, Circular 468,* Nov. 15, 1947, 43 pages.

Circuits are defined as being "printed" when they are produced on an insulated surface by any process. Methods fall in six main classifications: painting, chemical deposition, vacuum deposition, die-stamping, and dusting. Methods used up to the present have been painting, spraying, and die-stamping. Production details as well as precautions and limitations. Many applications and examples. 60 ref.

21a-36. British Coinage and Coinage Alloys. W. A. C. Newman. *Endeavour,* v. 7, Jan. 1948, p. 15-20.

Metallurgical problems in the manufacture and analysis of coins.

21a-37. Plastic Tooling Comes of Age. Part II. Lawrence Wittman. *Tool & Die Journal,* v. 13, Feb. 1948, p. 55-56, 58, 62, 64, 74-76.

Miscellaneous applications, methods of use, and design considerations.

21a-38. Plastic Tooling Strong, Inexpensive and Easy to Produce. Lawrence Wittman. *Materials & Methods,* v. 27, Feb. 1948, p. 87-92.

Use of laminated plastics for forming tools, assembly fixtures, checking fixtures, and many other types of tooling, with few limitations as to size, shape, and service conditions.

21a-39. Can You Spotlight Handling Wastes? *Modern Industry,* v. 15, Feb. 15, 1948, p. 40-45.

Gives tips, largely for the metalworking industries.

21a-40. Automatic Assembly of Pistons and Connecting Rods. *Automotive Industries,* v. 98, Feb. 15, 1948, p. 28.

Machine introduced by Ford Motor Co.

21a-41. Highlights of Monobilt Body Production. Joseph Geschelin. *Automotive Industries,* v. 98, Feb. 15, 1948, p. 30-31, 60.

Advanced materials handling methods used by Hudson in new plant layout.

21a-42. Mechanized Handling Eases Wheel Manufacture. Harry S. Wharen. *American Machinist,* v. 92, Feb. 26, 1948, p. 84-88.

Press-line layout for automobile-wheel manufacture. Diagrams and descriptions of forming tools and dies.

21a-43. Handling Materials in the Foundry Yard. Robert H. Herrmann. *Foundry,* v. 76, March 1948, p. 70-77.

21a-44. Notched Skid Bins Solve Crankshaft Handling Problem. *Iron Age,* v. 161, March 11, 1948, p. 130.

Substantial savings in handling crankshafts and other odd-shaped machine parts both in process and storage have been realized by notching of skid bins to hold the pieces solidly in place.

21a-45. Speeding Up Assembly Operations. *Machinery* (London), v. 72, Feb. 12, 1948, p. 217-222, 229.

Methods used at Lockheed Hydraulic Brake Co., Ltd., Leamington Spa, England, for hydraulic braking systems.

21a-46. Modern Methods; the Key to Western Industrial Success. E. L. Mathy. *Western Metals,* v. 6, Feb. 1948, p. 15-18.

A few examples of results achieved by better tools and progressive planning in mass-production fabrication.

21a-47. Straightline Magneto Production Affords Increased Product Quantity and Quality. Dan Reebel. *Steel,* v. 122, March 15, 1948, p. 96-100.

Methods used at Jack & Heintz, Cleveland.

21a-48. Modern Materials Handling and Processing Methods Boost Output at Westinghouse Buffalo Plant. *Machine and Tool Blue Book,* v. 44, March 1948, p. 141-148, 150, 152-154.

Production of squirrel-cage induction motors. Emphasized are materials handling, assembly, machining, welding, and coil winding.

21a-49. Ingenious Tooling and New Machine Tools Achieve High Rate of Production at Victor Equipment Co. Gerald E. Stedman. *Machine and Tool Blue Book,* v. 44, March 1948, p. 157-158, 160, 162, 164, 166, 168.

A special metal-twisting machine is among the special machines designed by Victor to raise production of welding and cutting equipment. Another interesting application is the use of special vacuum chucks.

21a-50. Planning for Plant Layout. A. E. Rylander. *Tool Engineer,* v. 20, March 1948, p. 41-46.

Concluding installment supplements the previous ones with a typical case study.

21a-51. Continuous Flow Production of Motors. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 39, March 1948, p. 82-85, 118-119, 126.

At A. O. Smith Electrical Mfg. Co., Los Angeles.

21a-52. Giftware. James Corcoran. *Western Machinery and Steel World,* v. 39, March 1948, p. 100-103.

Design and production of fancy metal ware of the type most commonly featured in gift shops, by Saxton, Inc., Los Angeles.

21a-53. Machine-Parts Handling. *Western Machinery and Steel World,* v. 39, March 1948, p. 114.

Solution of a problem involving crankshafts—a solution which can also be applied to the handling of other odd-shaped machine parts.

21a-54. A Very Light Touch! John Gilbert. *Applied Hydraulics,* v. 1, March 1948, p. 17-18, 38.

Use of hydraulic equipment in assembly of small silver contacts and bases.

21a-55. Air-Powered Devices Increase Machine Output. Rupert Le Grand. *American Machinist,* v. 92, March 25, 1948, p. 88-91.

Varied applications.

21a-56. Triple-Acting Press Assembles Stators. H. H. Geimeier. *American Machinist,* v. 92, March 25, 1948, p. 98.

21a-57. Railroad Handling Method Cuts Shipment Costs. *Steel,* v. 122, March 29, 1948, p. 96.

Aluminum truck-trailer body developed by Reynolds Metals. Designed to handle loads up to 20,000 pounds, the units are transported between shippers' loading docks and freight yards on special frames, and are shifted mechanically to standard-type flat cars. At the destination they are shifted back onto trailers and delivered to consignee's door.

21a-58. Ship Repairs at Todd Shipyards. Howard Campbell. *Modern Machine Shop,* v. 20, April 1948, p. 124-128, 130, 132, 134, 136, 138.

Welding, metal spraying, reblading, machine-shop operations, sheet-metal work, and inspection practices.

21a-59. Modernization Program Ends Fabricating Shop Bottlenecks. W. G. Paton. *Iron Age,* v. 161, April 1, 1948, p. 86-89.

How combining modern materials-handling techniques with improved plant layout had enabled Austin Co. to meet mounting production costs and increase output.

21a-60. Fabricated Electric Motors. *Machinery* (London), v. 72, Feb. 19, 1948, p. 237-242.

Fabrication methods used by a British firm. Press work and assembly.

21a-61. Radiator Cores. *Automobile Engineer,* v. 38, March 1948, p. 93-96.

Semi-automatic assembly machine.

21a-62. Motor Cars for Export. *Machinery* (London), v. 72, March 11, 1948, p. 331-341.

Equipment and procedures in production of Austin cars in Britain. Production of valves and rear-axle housings, especially machining operations.

21a-63. Metallized Circuits. John T. Collier. *Product Engineering,* v. 19, April 1948, p. 141-143.

New technique for mass production of electrical circuits using metal spraying through a stencil. Advantages and costs.

21a-64. Monorail Raises Production of Screw Machines. M. M. Roberts. *Factory Management and Maintenance,* v. 106, April 1948, p. 75.

21a-65. Buick's Dynaflow Drive Built to Aircraft Tolerances. Charles H. Wick. *Machinery,* v. 54, April 1948, p. 135-142.

Processes developed to meet unusual problems encountered in producing this unit economically on a mass-production basis.

21a-66. Curved Chutes Aid Work Ejection. Harry S. Wharen. *American Machinist,* v. 92, April 8, 1948, p. 88-89.

Handling equipment for removing electric-motor rotor and stator laminations from five-stage progressive die.

21a-67. Pistons and Con Rods Machine-Assembled. Chester S. Ricker. *American Machinist,* v. 92, April 8, 1948, p. 111.

A new machine is used.

21a-68. Pneumatic Chip Conveying Centralizes Storage, Reduces Costs and Eliminates Accidents. H. M. Nichols. *Steel,* v. 122, April 19, 1948, p. 81-82, 84.

21a-69. Overhead Carrier System Streamlines Material Flow at J. & L.'s Wire Plant. *Steel,* v. 122, April 19, 1948, p. 92, 94.

21a-70. Money Is Their Product; the U. S. Mint at San Francisco. Ralph G. Paul. *Western Machinery and Steel World,* v. 39, April 1948, p. 66-69, 94-96.

Some of the methods used which include melting, casting, rolling, press operations and annealing.

21a-71. Chevrolet; Los Angeles. *Western Machinery and Steel World,* v. 39, April 1948, p. 70-73, 102.

Miscellaneous procedures and equipment of new assembly plant.

21a-72. Bolts and Nuts Are Moving West. *Western Machinery and Steel World,* v. 39, April 1948, p. 86-88.

Facilities in Los Angeles plant.

21a-73. Engineering the Tin Can. H. S. Van Vleet. *Mechanical Engineering,* v. 70, April 1948, p. 315-320.

Engineering phases of canmaking; corrosion resistance; and steps taken toward conservation of tin. 14 ref.

21a-74. Arc Welding; Manufacture of Plant and Electrodes. *Metal Industry,* v. 72, April 9, 1948, p. 289-290.

Production of metallic arc electrodes from rolled rod.

21a-75. Smaller Valves Using Drop Forged Components Accommodate Higher Temperatures and Pressures. Dan Reebel. *Steel,* v. 122, April 26, 1948, p. 104-107.

Metalworking techniques, combined to form a completely integrated operation in production of steel iron, and bronze valves up to and including 600-lb. units. Casting, forging, machining, finishing, and inspection.

21a-76. Planned Assembly; Methods Employed on Master Cylinders for Lockheed Hydraulic Brakes. *Automobile Engineer,* v. 38, April 1948, p. 134-136.

21a-77. Green Core Handling Simplified by Special Rack and Truck. *Iron Age,* v. 161, April 29, 1948, p. 90.

Transportation of large batches of green cores from coremaker to bake ovens has been simpilfied by use of a specially built, shelved rack.

21a-78. Mobile Handling for Pipe. *Flow,* v. 3, May 1948, p. 34-37.

Advantages in using self-propelled yard cranes with traveling bridge cranes.

21a-79. At Sargent's Mechanized Foundry All Operators Meet the Trains. *Flow,* v. 3, May 1948, p. 44-48, 74-78.

Conveyer method whereby 50% more castings can be produced with the same floor space and with no increase in manhours.

21a-80. Massey-Harris' New Setup for Tractor Production. Joseph Geshelin. *Automotive Industries,* v. 98, May 1, 1948, p. 24-26, 62.

21a-81. Automatic Assembly Jumps Output 47 Times. Paul Bonness. *American Machinist,* v. 92, May 6, 1948, p. 96-97.

Hopper feed of rollers to final station of progressive die eliminates hand assembly and increases output of latch assemblies for Square D electrical control units from 32 to 1500 per hr.

21a-82. Conveyerization Increases Steadily in Metalworking Plants. *Steel,* v. 122, May 10, 1948, p. 104, 107.

Results of survey of 2000 metalworking establishments.

21a-83. Chemical Plant Fabrication. W. K. B. Marshall. *Metal Industry,* v. 72, April 23, 1948, p. 323-325, 330.

An illustrated description of activities of a British firm which is engaged in the design, manufacture, and erection of processing plant for the dairy, brewery, food, paint, pharmaceutical, and similar industries. Both ferrous and nonferrous metals and alloys are used.

21a-84. Building Servi-Cycles Better and Faster. C. H. Vivian. *Compressed Air Magazine,* v. 53, May 1948, p. 109-114.

Equipment and procedures. The Servi-Cycle is a motor bicycle plus a small "trailer" for delivery of parcels.

21a-85. Efficient Tool Engineering Cuts Motor Costs. Watson N. Nordquist. *Tool Engineer,* v. 20, May 1948, p. 33-34.

Production of electric motors.

21a-86. Subassembly Tooling. *Aircraft Production,* v. 10, May 1948, p. 164-166.

Use of Erco fixtures and riveting machine by Consolidated Vultee.

21a-87. Material Handling Efficiency Increases Output, Cuts Costs. Herbert Chase. *Iron Age,* v. 161, May 13, 1948, p. 84-89.

Combinations of stationary and portable hoppers, elevating belts, and other time-saving techniques.

21a-88. A Unique Development in the Gear Industry. *Western Machinery and Steel World,* v. 39, May 1948, p. 92-93.

Manufacture and distribution of special gears.

21a-89. Mechanizing Cleaner Manufacture Ups Output, Saves Floor Space. A. F. Murray. *American Machinist,* v. 92, May 20, 1948, p. 110-113.
Production was increased 300% with only 50% increase in floor-space by extensive conveyerizing.

21a-90. Continued Expansion Seen in Use of Power-Driven Portable Tools. *Steel,* v. 122, May 24, 1948, p. 102, 104.
The six types studied included drills, grinders, riveters, wrenches, saws or nut runners, and screw drivers.

21a-91. New Reliance Plant Features Modern Handling Methods. *Iron Age,* v. 161, June 3, 1948, p. 81.

21a-92. Versatile Skid Expedites Material Handling in Stamping Plant. L. M. Beckwith. *Iron Age,* v. 161, June 3, 1948, p. 88-89.
An adaptable skid-platform system successfully used in one plant to obtain wide flexibility from a small number of handling units.

21a-93. Conveyer System Simplifies Coil Handling at Aliquippa. C. F. Seyler. *Iron Age,* v. 161, June 10, 1948, p. 86-89.
Use of a specially engineered pallet-type conveyer system to handle steel coils weighing up to 30,000 lb.

21a-94. An Advance in Spring Fabrication Methods. Gerald E. Stedman. *Industrial Gas,* v. 26, May 1948, p. 12-13, 21-23.
Production procedure.

21a-95. Production Flow Charts. Part 5. Automobiles: Ford Motor Co., Dearborn, Mich. *Factory Management and Maintenance,* v. 106, June 1948, insert between p. 96 and 97.

21a-96. Process Control Corrects Faulty Methods. Chester S. Ricker and R. H. McCarroll. *American Machinist,* v. 92, June 3, 1948, p. 112-115.
Miscellaneous applications at Ford Motor Co.

21a-97. Revamped Fabricating Procedure Cuts Final Assembly Time of Unit Speed Heaters. L. E. Browne. *Steel,* v. 122, June 14, 1948, p. 116, 118, 120, 123, 126.
Revamped final assembly procedure, and by design and tooling changes also simplified and standardized feeder line production of parts.

21a-98. J35-A-15 Turbo-Jet Engine Production at Allison. Joseph Geschelin. *Automotive Industries,* v. 98, June 15, 1948, p. 35-37.

21a-99. Tooling Techniques at Presteel. E. J. Tangerman. *American Machinist,* v. 92, June 17, 1948, p. 91-94.
Typical inexpensive setups.

21a-100. Pneumatic Muscles Clamp and Assemble. Chester S. Ricker. *American Machinist,* v. 92, June 17, 1948, p. 112-113.
Use of air-clamping for miscellaneous heavy jobs.

21a-101. Seidelhuber's Five Point Program Cuts Costs—Produces Profits. Howard E. Jackson. *Modern Industrial Press,* v. 10, June 1948, p. 22, 24, 26, 49.
Procedures and equipment for manufacture of complete line of automatic electric hot-water heaters with both bronze and galvanized steel tanks ranging from 15 to 100-gal. capacities. Stamping, forming. and drawing; complete assembly; application of baked enamel; crating; and shipping.

21a-102. Bearing Manufacture; The Alperton Works of the Glacier Metal Co., Ltd. *Metal Industry,* v. 72, June 11, 1948, p. 477-480, 482.

21a-103. Manufacture of Direct Drive Motors at Knapp-Monarch Company. Gerald Eldridge Stedman. *Machine and Tool Blue Book,* v. 44, July 1948, p. 143-146, 148, 150.

21a-104. Ford's Radical Radiator Production Line. Chester S. Ricker. *American Machinist,* v. 92, July 1, 1948, p. 77-81.
Unique production-line methods including forming, swaging, soldering, and materials handling.

21a-105. Tubes Keep Ball Bearing Clean. A. M. Murray. *American Machinist,* v. 92, July 1, 1948, p. 102.
Vending-machine technique speeds assembly and insures clean bearings. Air plunger pushes ball bearings from closed tube directly into the hand of the assembler.

21a-106. Special Buffing Machines and Fixtures Reduce Plating Shop Costs. Earl Moore. *Iron Age,* v. 162, July 8, 1948, p. 80-85.
Semiautomatic machines for plating of zinc diecastings for automotive parts and plumbing fixtures.

21a-107. Fixture Locates Rotor Assemblies. W. C. Henderson. *American Machinist,* v. 92, July 15, 1948, p. 119.
Fixture to facilitate assembly of induction-motor cores to their shafts by shrinking, requires accurate positioning of both parts while the cores are cooling.

21a-108. The Tool Engineering Department—Its Organization and Function. Frank S. Dobric. *Iron Age,* v. 162, July 15, 1948, p. 72-79.

How Reliance Electric & Engineering Co. has organized its tool-engineering department to obtain the most effective use of its facilities. Specific examples of how this department has handled various projects.

21a-109. Chain. N. I. Bond-Williams. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 142-146; discussion, p. 147-152.

Manufacture of knotted chain—in which the links are twisted together instead of being welded into continuous ovals or circles.

21a-110. Stepping-up Automatic Calculator Production in San Leandro. *Western Metals,* v. 6, July 1948, p. 24-25.

Procedures and equipment.

21a-111. Fresno Equips the Wine Industry. Ralph G. Paul. *Western Machinery and Steel World,* v. 39, July 1948, p. 84-87, 107.

Equipment and procedures used for production of miscellaneous wine-industry equipment.

21a-112. Precision Control Systems. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 39, July 1948, p. 88-91.

Manufacture of above equipment for automatic control of gas-fired heating appliances.

21a-113. Submersible Electric Motors Pump California's Water. Paul Graham. *Western Machinery and Steel World,* v. 39, July 1948, p. 92-95, 117.

Production of these pumps.

21a-114. Precision Die Work Pays Off. J. G. Blane. *Western Machinery and Steel World,* v. 39, July 1948, p. 99-101, 128.

Equipment and procedures.

21a-115. Coming — Kitchen Angels. *Western Machinery and Steel World,* v. 39, July 1948, p. 102-103.

Production of new type dishwashing machine—the "Kitchen Angel". It consists of a deep metal tub and lid, a spray, two couplings, and two other fittings, and a length of hose. These parts are then assembled.

21a-116. How Renault Has Modernized Its Plant to Triple Output. W. F. Bradley. *Automotive Industries,* v. 99, July 15, 1948, p. 24-26, 60, 62, 64.

Retooling program for production of a four-passenger, rear-engined car.

21a-117. Sheet Metal Operations in Aircraft Supply Plant Revolve About "Air Power". *Steel,* v. 123, July 26, 1948, p. 97, 100.

Miscellaneous applications of compressed air.

21a-118. Improved Material for Magnetic Amplifiers. *Electronics,* v. 21, Aug. 1948, p. 128, 130, 164, 166.

Summary of four papers presented at symposium on magnetic materials, Washington, D. C., June 15, 1948. Production of a suitable core material by cold reduction and annealing of "Permenorm 5000-Z" at Naval Ordnance Laboratory was described by G. W. Elmen, E. A. Gangler, and E. Both. Includes melting, casting, and forming procedure. A. O. Black described characteristics of the electromagnetic amplifiers thus obtained. Frank Logan reviewed development of saturable reactors and magnetic amplifiers. Otto Jensen showed how efficient electromechanical rectifiers could be built using saturable reactors.

21a-119. Visits to Works. *Iron and Steel,* v. 21, July 1948, p. 335-342.

Various procedures at following English plants: Ealing Park Foundry, Ltd.; Foundry at R. & A. Main, Ltd.; Fraser and Chalmers Engineering Works; and the Ford Motor Co. works at Dagenham.

21a-120. The First Automatic Radio Factory. *Fortune,* v. 38, Aug. 1948, p. 90-93.

Revolutionary British machine which builds three radio circuits a minute without human touch. Steps include milling, grit-blasting, inspection, metalizing, and assembly.

21a-121. Fuel Injection Equipment. *Automobile Engineer,* v. 38, July 1948, p. 255-263.

Layout of the main machine shop, and machining methods for pump housings, camshafts, and plunger and barrel units. (To be continued.)

21a-122. A One-Step Assembly. *Applied Hydraulics,* v. 1, Aug. 1948, p. 10-11, 24.

A specialty jobber of electrical equipment gained in accuracy and speed of assembly, reduced scrap and changeover time and increased production by the use of hydraulically-operated presses of their own design.

21a-123. Tailored-to-the-Job Machines. Ed. Karpick. *Steel,* v. 123, Aug. 9, 1948, p. 74-77.

Modern machines supplied by other manufacturers and special equipment designed and built which enables semiskilled workers to perform a large number of jobs. Conveyers, trucks and hoists used extensively to decrease manual handling and speed production.

21a-124. The Works of the David Brown Organization. Part III and Part IV. (Concluded.) *Engineer,* v.

186, July 16, 1948, p. 67-69; July 23, 1948, p. 78-81.

Manufacture of large gear wheels and operations at the Penistone Foundry which specializes in production of high tensile, corrosion and heat resisting alloy steel castings weighing up to 7½ tons.

21a-125. Alarm Clock Manufacture. *Machinery* (London), v. 73, July 22, 1948, p. 87-95.

Intensive methods employed by Smiths English Clocks, Ltd.

21a-126. Motor Industry Methods Applied to Hopper-Car Manufacture. *Steel,* v. 123, Aug. 16, 1948, p. 90-92.

Introduction of complete welding operations and a new assembly line technique has resulted in an extraordinary production rate of 25 or more 70-ton coal hopper cars daily.

21a-127. The Production of Alarm Clock Components. *Machinery* (London), v. 73, July 29, 1948, p. 115-121.

Special equipment and methods employed at a Lanarkshire, England, factory.

21a-128. Ford Buys in the West. *Western Machinery and Steel World,* v. 39, Aug. 1948, p. 74-95.

Manufacturing experiences and procedures of the Ford Motor Co., at its western plants: Ford Buys in the West, L. C. Disser; Springs & Bumpers Since 1917, John B. Rauen, Jr.; Streamlining for Mass Production, Robert J. Cannon; Wheel Production, Kenneth T. Norris; Forging for Ford, James W. Sheehan; Automotive Rubber Parts, John B. Watson; Heading and Threading; Cold-Heading Specials for Ford, C. W. Hyden; Transfer Molded Rubber and Metal Inserts, T. L. Tafe; There is More Than Wire in Springs, Frank O. Holister; Mass Production is Our Business, W. T. Davis; and Hand Tools for Ford, Morris B. Pendleton.

21a-129. Modern Machines and Methods Speed Growth of York Corporation Cooling Units. P. D. Aird. *Modern Industrial Press,* v. 10, Aug. 1948, p. 13-14, 16, 48-49.

Special machines and fixtures; unusual applications of old and tested engineering principles; installation of the latest in dies and automatic handling equipment.

21a-130. Mobile Presses Produce Variety of Wares at Northwest Metal Products. Howard E. Jackson. *Modern Industrial Press,* v. 10, Aug. 1948, p. 30, 32, 34, 36.

Installations which enable above factory to complete all operations under one roof and on a high production scale.

21a-131. Automatic Production of Radio Equipment. *Machinery Lloyd* (Overseas Edition), v. 20, Aug. 14, 1948, p. 73-77.

Fully automatic methods used by a British firm.

21a-132. Producing the Seeburg Non-Stop Record Player. T. E. Lloyd. *Iron Age,* v. 162, Aug. 26, 1948, p. 86-92.

The incorporation of strength, light weight, and trouble-free and vibrationless operation into the new Seeburg Select-O-Matic "200" Library involved a careful selection of materials as well as ingenuity in design. Manufacture, material selection and construction.

21a-133. General Purpose vs. Special Purpose Machines for Mass Production. E. K. Morgan. *Production Engineering & Management,* v. 22, Sept. 1948, p. 51-56.

Graphically establishes the dividing line, based on product volume, for the economical use of general-purpose machines or line equipment.

21a-134. Mass Manufacture of Precision Made Parts: General Motors, Diesel Equipment Division, Grand Rapids, Michigan. *Production Engineering & Management,* v. 22, Sept. 1948, p. 59-66.

Equipment and procedures for machining, heat treatment, and inspection.

21a-135. Mass Producing 15-Ton Bulldozers. Walter J. Brooking. *Iron Age,* v. 162, Sept. 2, 1948, p. 82-86, 142.

Standardization of production methods and equipment and extensive utilization of arc welding are features of the planned production of bulldozers at Le Tourneau's new Longview, Texas, plant. Fixtures, jigs and holding devices for machining and welding assure uniformity of quality and optimum production.

21a-136. Aircraft Fixtures Make Trolley-Coach Assemblies. Seth C. Klein. *American Machinist,* v. 92, Sept. 9, 1948, p. 88-91.

Manufacture of trolley-coach bodies utilizing principles of stressed-skin construction perfected during the war by aircraft designers. Also adapted from the aircraft industry was the basic idea of constructing sidewalls, roof, and front and rear end subassemblies as completed units on fixtures set apart from the final assembly line.

21a-137. Air-Operated Tools in Power Shovel and Crane Assembly Lines. *Machinery,* v. 55, Sept. 1948, p. 191-192.

Uses at Thew Shovel Co., Lorain, Ohio.

21a-138. Automatic Hoppers Speed Assembling. A. E. Rylander. *Tool Engineer,* v. 21, Sept. 1948, p. 17-19.

Various types applicable to both similar and dissimilar parts.

21a-139. Auto-Lite's Flexible Setup. Joseph Geschelin. *Automotive Industries,* v. 99, Sept. 15, 1948, p. 26-28, 88, 90.

Equipment and procedures by which more than 800 variations of distributors and about 100 types of ignition coils are produced at Toledo plant. Machine-shop operations and finishing and plating procedures.

21a-140. Turbine Engine Blading: Manufacturing Technique and Fastening Methods. A. T. Colwell and R. E. Cummings. *SAE Quarterly Transactions,* v. 2, July 1948, p. 419-433.

The British method of attaching the bucket by loosefit, fir-tree root is considered to be the best all around method developed to date. Problems of large-scale production welding of turbine-wheel buckets, both from the manufacturing and the field replacement viewpoints. Future possibilities for improvement of design, alloys, and manufacturing methods are believed to be very great.

21a-141. Two-Wheeled Horsepower. *Western Machinery and Steel World,* v. 39, Sept. 1948, p. 90-92.

Manufacture of Mustang motorcycle.

21a-142. Sea Fury in Production. James Hay Stevens. *Aircraft Engineering,* v. 20, Sept. 1948, p. 252-266.

Methods used by Hawker Aircraft, Ltd., in the manufacture of the Royal Navy's latest fighter.

21a-143. The Production of Springs and Other Parts for Alarm Clocks; Methods Employed at the Carfin Factory of Smiths English Clocks, Ltd. *Machinery* (London), v. 73, Sept. 23, 1948, p. 463-466.

21a-144. Piston Assembly Machine. *Product Engineering,* v. 19, Oct. 1948, p. 92-93.

Machine which forms rings from wire stock and inserts wristpins in pistons and connecting rods.

21a-145. Streamlined Production Flow, Original Tooling at Bush Mfg. Co. Gerald Eldridge Stedman. *Machine and Tool Blue Book,* v. 44, Oct. 1948, p. 115-120.

Production of condensers, evaporators, unit coolers, and special steam and water-coil equipment. Bending, forming, joining, and assembly operations.

21a-146. Hawker Sea Fury. Part I. General Design and Basic Production Methods; Fuselage Sub-Assemblies and Tooling. S. C. Poulsen. *Aircraft Production,* v. 10, Oct. 1948, p. 342-350.

Structure of above aircraft and some of the basic manufacturing processes. These processes include use of the rubber-die press and section-rolling machines—and also the use of some unusual pneumatic machines for stretch-forming and contour-rolling. Typical subassembly tooling for some of the front-fuselage components.

21a-147. Improved Methods Speed the Production of Scales. *Production Engineering & Management,* v. 22, Oct. 1948, p. 60--66.

Procedures and equipment. Part of the savings in production cost stem from the use of plastic and die-cast parts which in many cases require far less processing. Jigs and fixtures; and machining, press, and finishing operations.

21a-148. How Buick Builds the Dynaflow. Chester Ricker. *American Machinist,* v. 92, Oct. 21, 1948, p. 91-95.

A wide variety of equipment and procedures used.

21a-149. Creating a Kodak. H. E. Linsley. *American Machinist,* v. 92, Oct. 21, 1948, p. 98-100.

Use of standard and special equipment at Eastman Kodak to manufacture a precision product on a quantity production basis.

21a-150. Ford Handles by Automation. Rupert Le Grand. *American Machinist,* v. 92, Oct. 21, 1948, p. 107-122.

Applications of the "automation" technique to presses, welders, and other equipment. Automation is the art of applying mechanical devices to manipulate workpieces into and out of equipment, turn parts over between operations, remove scrap, and to perform these tasks in timed sequence with the production equipment so that the line can be put wholly or partially under pushbutton control at strategic stations.

21a-151. Precise Processing Produces Flatirons Faster. Leo J. Pantas. *American Machinist,* v. 92, Nov. 4, 1948, p. 98-100.

How die-cast aluminum shoes with cast-in heating elements and ingenious tooling combine to speed production of domestic flatirons.

21a-152. Streamlined Production: Burroughs Adding Machine Company. *Production Engineering & Management,* v. 22, Nov. 1948, p. 59-66.

Equipment and procedures used in production of business machines.

21a-153. Involute Spline Experience. Charles H. Stanard. *American Society of Mechanical Engineers, Advance Paper* No. 48-SA-20, 1948, 7 pages.
Manufacture and functioning of splines in the automotive industry. Various methods of production.

21a-154. Salvo by Douglas; El Segundo. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 82-85.
Miscellaneous production methods and equipment used in military-plane production.

21a-155. Lockheed Machinery and Aviation. E. H. Farmer. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 86-89, 124.

21a-156. North American's World Champion. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 90-91.
Procedures and equipment in production of the F-86 and B-45.

21a-157. Exacting Tests at Northrop. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 92-93.
Production and structural testing of four specialized military planes.

21a-158. New Travel Era by Convair-Liners. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 94-96.
Production facilities.

21a-159. Boeing Builds Them Big. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 97-99.
Boeing planes and production facilities.

21a-160. Ryan's Navions. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 100-101.
Production of personal plane.

21a-161. Springs for Western-Built Freight Cars. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 118-119.
Production of above and also other types of leaf and coil springs down to very small ones.

21a-162. Hawker Sea Fury, Part II. Front Fuselage Assembly; Rear Fuselage; Tail-Bay With Integral Fin. S. C. Poulsen. *Aircraft Production,* v. 10, Nov. 1948, p. 366-374.
Production and assembly. (To be concluded.)

21a-163. Streamlined Production; International Harvester Company, Louisville, Kentucky. *Production Engineering & Management,* v. 22, Dec. 1948, p. 59-66.
Equipment and procedures for production of farm tractors.

21a-164. Liquid Nitrogen Simplifies Bearing Assembly. R. E. Bludeau. *American Machinist,* v. 92, Dec. 16, 1948, p. 82-83.
How interference fits of 0.017 in. are reduced to 0.012-in. clearance by cooling the bearing ring in liquid nitrogen in a simple container.

21a-165. Material Handling in a Malleable Foundry Processing Department. N. J. Henke. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 476-480; discussion, p. 481.
Previously abstracted from *American Foundryman,* v. 11, May 1947, p. 48-52. See item 25-76, 1947. Also appeared as Preprint No. 47-22, 1947.

21a-166. Problems Involved in the Fabrication of High Temperature Alloys. Gunther Mohling. *Yearbook of the American Iron and Steel Institute,* 1947, p. 519-525; discussion, p. 525-527.
Previously abstracted from preprint. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.) See item 23-261, 1947.

21b—Ferrous

21b-1. The Production of Pliers. *Machinery* (London), v. 71, Nov. 20, 1947, p. 563-567.
Methods used by British firm.

21b-2. Manufacture of Flexible Roller Bearings. *Machinery* (London), v. 71, Dec. 4, 1947, p. 619-623.
Methods used by a British firm.

21b-3. Modern Material Handling in a High-Carbon Wire Mill. LeRoy D. Seymour. *Wire and Wire Products,* v. 23, Jan. 1948, p. 45-46, 98.
Methods and equipment used by John A. Roebling's Sons Co.

21b-4. Roamin' Numerals. O. A. Battista. *Steelways,* Jan. 1948, p. 6-7.
Manufacture of license plates from hot rolled steel.

21b-5. The Long Knives of Collinsville. Richard Wilcox. *Steelways,* Jan. 1948, p. 8-11.
Production of the knives known as machetes.

21b-6. Overhead Coil Conveyer Saves Space for Other Mill Operations at Weirton Steel. *Steel,* v. 122, Jan. 19, 1948, p. 73.

21b-7. Golf Club "Irons" From Stainless Steel. Arthur Q. Smith. *Industrial Gas,* v. 26, Jan. 1948, p. 12-13.
Production methods and equipment.

21b-8. Knitting Machine Manufacture. *Machinery* (London), v. 72, Jan. 1, 1948, p. 3-10.
Methods and equipment.

21b-9. Cast Iron Pipe Is an Engineering Product With High Quality Built Into Each Casting Under Control of

Foundry Laboratories. *Cast Iron Pipe News,* v. 14, Jan. 1948, p. 16-21.
Production and test methods and equipment.

21b-10. Palmer Welloct Tool Corp. Ups Production 100% in Expansion Program. *Modern Industrial Press,* v. 10, Jan. 1948, p. 42, 44.
Miscellaneous procedures and equipment used in fabrication of machinist's tools and general hardware.

21b-11. Views of Plymouth, Mich., Plant of Evans Products Co. *Stove Builder,* v. 13, Feb. 1948, p. 42-46.
Production of oil-fired space heaters, water heaters, and furnaces.

21b-12. Advantages of Integrated Manufacturing. Gerald Eldridge Stedman. *Steel,* v. 122, Feb. 16, 1948, p. 85-87, 119, 122.
Equipment and procedures of plant where steel foundry, machine shop, fabricating and manufacturing departments cooperate closely to produce components for earthmoving equipment.

21b-13. Simple Brushing Setup Descales Conveyer Chain. *Products Finishing,* v. 12, Feb. 1948, p. 92.
Unique power-brushing technique that reduces conveyer-chain maintenance used in refrigerator plant.

21b-14. Kalamazoo Stove and Furnace Company; a Modern Range Producing Plant. *Better Enameling,* v. 19, Feb. 1948, p. 8-15.
Fabrication, enameling, and materials-handling procedures and equipment.

21b-15. Steel and Your Sewing Machine. James H. McCormick. *Du Pont Magazine,* v. 42, Feb. 1948, p. 6-8.
Production of sewing-machine parts, with emphasis on casehardening.

21b-16. California Warms the Country. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 86-89, 122.
Production of forced-draft electric heaters. Includes welding, finishing, stamping, shearing, and assembly operations.

21b-17. Yoke and Pole Pieces for Cyclotron Magnet. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 170.
Production from ingots to finished product. The yoke is 33 ft. long, 21 ft. high, and 14 ft., 2 in. wide, with a window 22 ft., 6 in. by 10 ft., 6 in., in which are placed the upper and lower pole pieces of the magnet. It is built up of heavy forged steel plates bolted together. Total weight of the cyclotron magnet is approximately 2000 tons.

21b-18. Air Conditioning Cuts Rust Spoilage. Nathan N. Wolpert. *Heating and Ventilating,* v. 45, Feb. 1948, p. 81-82.
Production of ball bearings to extremely close tolerances and exact quality control, largely made possible by use of air conditioning at S.K.F. Industries, Inc.

21b-19. Fabricating Automobile Molding Clips. Herbert Chase. *Iron Age,* v. 161, Feb. 19, 1948, p. 74-77.
For faster and better appearing installation of stainless molding trim on automobiles, Buick has developed an elliptical clip to which a stud is attached for assembly to panels. Production of this assembly which utilizes a progressive die with a dial arrangement for fastening or staking the screw to the stamping.

21b-20. Hypodermic Tubing Production. *Machinery* (London), v. 72, Jan. 29, 1948, p. 139. Based on B.I.O.S. Report No. 1428.
Methods used by German firm using Ni-Cr steel.

21b-21. Overhead Handling System Speeds Foundry Operations. Francis A. Westbrook. *Foundry,* v. 76, March 1948, p. 218-219.

21b-22. Improved Tooling Boosts Output at Nash-Kelvinator Plant. Seward N. Lawson. *Production Engineering & Management,* v. 21, March 1948, p. 53-56.
Use of transfer-type line-production and special-purpose machines in the retooling of production lines for manufacture of refrigeration equipment. Includes use of welding.

21b-23. Steel for Shaves. *Business Week,* March 13, 1948, p. 44, 46.
Economics and technology of razor-blade manufacture.

21b-24. Planned Tooling Whittles Costs. Harry S. Wharen. *American Machinist,* v. 92, March 11, 1948, p. 140-143.
Use for miscellaneous fabrication operations at Douglas Aircraft.

21b-25. The Handling of Sheet Steel. Russell L. Franing. *Finish,* v. 5, March 1948, p. 21, 64.
Materials-handling procedures used by International Harvester Co., East Moline, Ill.

21b-26. Production of Hussmann Refrigerators and Refrigerator Equipment. Ralph M. Grueber. *Modern Industrial Press,* v. 10, March 1948, p. 42, 44, 52.
Various fabrication operations, including press operations, welding, metal cleaning, enameling, and materials handling.

21b-27. Tin Plate "Doubling" in Can Fabricating Eliminated by Simple Magnet. *Steel,* v. 122, March 22, 1948, p. 106.

Air-blast separation used in the past frequently failed to separate the sheets, and doubles were fed into coating units and can-fabricating machinery. This sometimes caused cracked dies and more often required time-consuming manual separation and refeeding. Use of magnetic preseparator eliminated the difficulty.

21b-28. German Methods in Developing Turbine-Wheel Blades for the Jumo-004. Heinrich K. O. Adenstedt. *Technical Data Digest,* v. 13, March 15, 1948, p. 7-13.

The wheel was about 27½ in. in diameter and had 61 blades 4.33 in. in length attached to it by two riveted pins. Compositions of different steels tried, various production and service difficulties encountered, method used for temperature measurement of disk surfaces, and final specifications adopted for control of melting and forging procedures and for inspection and testing of the completed wheels.

21b-29. Plymouth's Unique Conveyers. *SAE Journal,* v. 56, March 1948, p. 29-34. Excerpts from "Material Handling-Conveyers", by John vonRosen.

Unusual methods used in assembly of Plymouth automobiles.

21b-30. Raw Materials Handling in the Steelworks Storage Yard. Frank C. Wier. *Steel,* v. 122, March 29, 1948, p. 101, 104, 107, 110, 112.

21b-31. Sachkenntnis. *Industrial and Engineering Chemistry,* v. 40, April 1948, p. 7A, 10A.

The title is a German word corresponding to the American "know-how". Several ingenious and unique German fabrication techniques displayed at the Bureau of Mines' coal-liquefaction experiment station, Louisiana, Mo., are briefly described. The most interesting is the "Wickelofen", a 61-ton heat-exchanger unit tested to withstand 910 atmospheric pressure, whose main cylinder is a steel tube of less than 1-in. thickness, spirally wound with 14 layers of 79 x 8-mm. corrugated steel tape. This tape is applied at 800-900° C., using a special lathe, and is quenched immediately to create continuous stress which increases the strength of the finished tube 54% over that of a solid tube of similar size. The most significant advantage is ease of fabrication over conventional forging. The unit was widely used in ammonia, methanol, and hydrogenation units.

21b-32. Hudson Final Assembly Layout Quite Different Than Others. Joseph Geschelin. *Automotive Industries,* v. 98, April 1, 1948, p. 28-29, 60.

With introduction of its new Monobilt body—a structure combining the body and frame in an integral unit—Hudson found it necessary to develop special techniques for fabrication and to make a complete revision of its final car-assembly procedures.

21b-33. Applying Continuous Steel Sheathing to Electric Cable. *Machinery* (London), v. 72, Feb. 19, 1948, p. 245-246. Based on B.I.O.S. Report No. 1570.

Ingenious method developed in Germany. The material, in the form of steel strip, is drawn from a reel, wrapped into tubular form, and welded longitudinally between an outer roller electrode and an inner tubular electrode surrounding the cable core. A length of seam is welded while the inner electrode moves forward with the outer sheathing. Then the welding current is switched off, and the inner electrode returns to its starting position ready for the next welding traverse. Meanwhile, continuous corrugations are being rolled in the welded sheathing.

21b-34. Double Duty "Reefers" for 100 M.P.H. Service. *Inco,* v. 22, Spring 1948, p. 4-7.

Production of refrigerator cars from low-alloy steel.

21b-35. Mechanical Toy Production. *Machinery* (London), v. 72, March 18, 1948, p. 369-373.

Production of steel toy horses involves design, welding, finishing, materials handling, and plant layout.

21b-36. Special-Purpose Tools Boost Steel Spring Production. *Production Engineering & Management,* v. 21, April 1948, p. 67-69.

21b-37. New Development in Tin-Plate Manufacture. E. F. Harris. *Steel,* v. 122, April 12, 1948, p. 94, 96. A condensation.

New handling methods and equipment. (Presented at A.S.M.E. meeting, New Orleans, March 1-5, 1948.)

21b-38. Mass Producing Heavy Containers. *Western Machinery and Steel World,* v. 39, April 1948, p. 74-77, 100-101, 109.

Procedures and equipment used in producing 55-gal. petroleum and general utility drums, 5-gal. industrial paint pails, and 110-lb. grease drums. Operations include shaping, seaming, welding, testing, and finishing.

21b-39. Rapid Processing of Automobile Door Hinges. John A. Broden. *Iron Age,* v. 161, April 29, 1948, p. 86-90.

High-speed production methods for automobile door hinges, involving punching, drilling, broaching, and countersinking, as well as assembly and materials handling.

21b-40. Futuramic Bodies Require Major Change-Over. *Automotive Industries,* v. 98, May 1, 1948, p. 42-44.

Production equipment and methods.

21b-41. Diverse Assembly Methods Used to Build New Type Welder. Jay DeEulis. *Steel,* v. 122, May 10, 1948, p. 96-100.

21b-42. Inside Stuff About Lockers. Paul D. Green and Cliff Cochrane. *Steelways,* May 1948, p. 5-7.

Manufacture of steel lockers.

21b-43. Corrosion Gets the Cold Shoulder. *Steelways,* May 1948, p. 18-19.

Production of stainless-steel refrigerator shelves.

21b-44. Making Heavy Duty Trucks by Mass Production Methods. *Automotive Industries,* v. 98, May 15, 1948, p. 36-37, 85-86.

Use of power-driven assembly lines and monorail conveyers.

21b-45. Building Surface Condensers. *Steel,* v. 122, May 17, 1948, p. 72-76.

Tools, welding fixtures, and fabricating methods used to machine and assemble components of steam power plants. Operations required include rolling, forming, stamping, machining, drilling, welding, and assembly.

21b-46. Practice in a Precision Shop. *Sheet Metal Worker,* v. 39, May 1948, p.53-54, 68.

Production of vending machines, cabinets, and the like, requiring close-tolerance work.

21b-47. Fabricating Stainless Steel. *Sheet Metal Worker,* v. 39, May 1948, p. 57-60, 87. Based on address by Robert Nelson.

Recommended procedures for the sheet-metal worker, costs and outlets for the products.

21b-48. Westinghouse Makes Transformers With Minimum of Metal Handling. Walter Rudolph. *Modern Industrial Press,* v. 10, May 1948, p. 28, 30, 34, 36.

Materials handling, press operations, welding, and finishing.

21b-49. Body Building at Hudson; New Assembly Approach Used To Build Rigid Integral Units. A. H. Allen. *Steel,* v. 122, May 31, 1948, p. 60-62.

Fabrication of new type of car bodies known as "Monobilt".

21b-50. Better Built to do a Better Job. *Enamelist.* v. 25, May 1948, p. 18-24.

Production of miscellaneous automotive parts and home appliances.

21b-51. New Streamlined Bearing Plant. *Steel,* v. 122, June 7, 1948, p. 74-75.

21b-52. Making Wide Band Saws. *Machinery,* v. 54, June 1948, p. 168-169.

Methods and machinery employed in manufacturing wide band saws for use in the logging industry.

21b-53. Hollow Blades for Axial Flow Compressor. Russell Meredith and A. J. Phelan. *Metal Progress,* v. 53, June 1948, p. 841-847.

Development of satisfactory manufacturing methods for hollow blades. Since usual methods would not work, it was concluded that hollow blades fabricated from sheet metal formed in steel dies and arc welded would fulfill the requirements of precision, light weight, and mass-production potentialities. A 12%-Cr, 0.15%-C stainless steel was chosen. Layout, forming, welding, inspection, and testing.

21b-54. Making Summer Cooler. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 39, June 1948, p. 90-93, 117.

Forming, welding, and assembly in manufacture of air-conditioning equipment.

21b-55. Lincoln-Mercury Comes to California. *Western Machinery and Steel World,* v. 39, June 1948, p. 98-102.

Fabrication, assembly, and finishing procedures and equipment.

21b-56. Stainless Steel in Novel Product. Paul Graham. *Western Machinery and Steel World,* v. 39, June 1948, p. 103-105.

Fruit and vegetable reamer for household use.

21b-57. Bolt and Nut Specialties Produced in Western Plants. Frank J. Anderson. *Western Metals,* v. 6, June 1948, p. 26-27.

21b-58. Assembly-Line Machining Used to Produce Rock Bits for Petroleum Industry. Gerald Eldridge Stedman. *Steel,* v. 123, July 5, 1948, p. 91-92, 116.

Improved forging practice and die design reduce scrap costs and increase die life. Modern handling methods and specialized holding fixtures.

21b-59. All Steel Burial Caskets. J. R. Barefoot. *Iron Age,* v. 162, July 8, 1948, p. 72-77.

Mass production methods.

21b-60. Straight-Line Production Techniques Utilized for Processing Small Job Lots. *Steel,* v. 123, July 19, 1948, p. 94-98.
Fabrication methods used in the manufacture of steel exciter-end brackets for d.c. welding sets. Savings are made in both direct and indirect costs even though the normal production run is only 200 units. Procedures are forming, welding, grinding, machining, and drilling.

21b-61. Making a Mining Drill. L. Sanderson. *Mine & Quarry Engineering,* v. 14, July 1948, p. 217-219.
Selection of steel and fabrication procedures.

21b-62. Chains. P. Jump. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 128-132; discussion, p. 147-152.
Deals with wrought-iron chains, especially short-link chains. Requirements; design of links; chain materials; manufacture; examination and testing; and subsequent treatment and annealing.

21b-63. Arc-Welded Airscrew-Hubs. Clarence C. Mast, Paul F. Hackethal and Douglas W. Hamilton. *Aircraft Production,* v. 10, July 1948, p. 219-220.
Method for economical production.

21b-64. Mechanized Wheel Line Employs Automatic Methods to Build Automobile Components. *Steel,* v. 123, July 26, 1948, p. 66-68.
Thoroughly mechanized setup for fabricating automobile wheels used to turn out completed units with a minimum of manual handling. Forming, welding, trimming, materials handling, and inspection.

21b-65. Million and a Half Automotive Bearings a Month. Joseph Geschelin. *Automotive Industries,* v. 99, Aug. 1, 1948, p. 26-29, 92.
High production setup in ball-bearing plant.

21b-66. The Works of the David Brown Organization. *Engineer,* v. 186, July 2, 1948, p. 4-6; July 9, 1948, p. 33-35.
Procedures and equipment of British gear and power-transmission-unit manufacturer. (To be continued.)

21b-67. Diversified Applications of Stainless Clad Steel. L. W. Townsend. *Steel,* v. 123, Sept. 6, 1948, p. 95-96, 124, 126.
Fabrication and finishing procedure as well as applications.

21b-68. A New Type of Hollow Steel Propeller Blades. Kenneth Rose. *Automotive Industries,* v. 99, Sept. 1, 1948, p. 32-33, 86, 88.
Production by forming and welding. Weight savings are achieved by an unusual combination of materials and fabricating methods.

21b-69. Producing Wire for the Fastener Industry. J. R. Thompson. *Fasteners,* v. 5, No. 2, 1948, p. 16-19.
Methods used in manufacture of cold heading wire, recent innovations, scale removal, wire drawing, heat treating, and inspection.

21b-70. Spring Steels "Air Fabricated" at West Coast Automotive Parts Plant. *Steel,* v. 123, Sept. 20, 1948, p. 110, 113.
Use of compressed air for several operations in assembly and fabrication of leaf springs.

21b-71. Steel Flow Line Climbs Utah Canyon Slopes. *Western Metals,* v. 6, Sept. 1948, p. 30.
Pictures show production and installation of 8½-ft. steel pipe line for power-plant flume.

21b-72. Steel and Rubber for Aircraft Propellers. Kenneth Rose. *Materials & Methods,* v. 28, Sept. 1948, p. 66-68.
Previously abstracted from *Automotive Industries,* v. 99, Sept. 1, 1948, p. 32-33, 86-88. See item 21b-68, 1948.

21b-73. "Flow-Production" Processing Minimizes Movement of Huge Press Components. Dan Reebel. *Steel,* v. 123, Sept. 27, 1948, p. 84-87.
Layout, equipment, and procedures for production of huge press components with welded frames.

21b-74. How to Prevent Gear-Grinding Troubles. L. P. Tarasov. *American Machinist,* v. 92, Sept. 9, 1948, p. 116-119; Sept. 23, 1948, p. 104-107.
First part discusses typical crack patterns, nature of burn, detection of burn by etching, sensitivity of steels to grinding, other metallurgical factors, dimensional factors, wheel sharpness, and other grinding factors. Part II describes trouble-shooting procedures and possible remedies. The discussion is clarified by several actual examples. Also deals with factors affecting the quality of ground surfaces.

21b-75. Stainless Par Beaters. *Steel Horizons,* v. 10, no. 4, [1948], p. 5-6.
Manufacture of stainless-steel golf clubs.

21b-76. Whitman & Barnes Makes It a Hundred. *Steel Horizons,* v. 10, no. 4, [1948], p. 18-20.
Production of twist drills by Detroit company.

21b-77. Chainmaking—Present-Day Practice. R. Bruce Vasey. *Steel,* v. 123, Oct. 4, 1948, p. 76-78.

Production of various types of steel chain by forging, forming, and welding. Heat treatment used.

21b-78. Coil Springs—From a Western Plant for Western Use. *Western Metals,* v. 6, Oct. 1948, p. 32-33.

21b-79. Ford's New Methods of Forming and Machining Axle Housings. Charles H. Wick. *Machinery,* v. 55, Nov. 1948, p. 152-161.

An unusual, high-production setup for manufacturing light-weight rear-axle housings from welded steel tubing. The work passes automatically through tube-reducing, welding, and machining operations on a completely mechanized production line.

21b-80. Handling Hot Steel Bars. L. E. Trishman. *Welding Engineer,* v. 33, Nov. 1948, p. 62.

Welded rig for handling long bars of alloy steel after heat treatment at high temperatures.

21b-81. Seattle "Aircraft Repair" Produces Seats for Independent Airlines. *Modern Industrial Press,* v. 10, Oct. 1948, p. 48, 50.

Welding, bending, machining, and other operations.

21b-82. Revolutionary Automation at Ford Operates with Iron Hand. Joseph Geschelin. *Automotive Industries,* v. 99, Nov. 15, 1948, p. 24-27, 70, 72.

System by means of which parts are automatically transferred successively from one machine to another in a straight line setup for mass production.

21b-83. Solar Handles Heat. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 102-104.

Fabrication of manifolds and heat resistant cowells, shrouds, muffs, heat exchangers and other related items for various types of planes and heat resistant units for gas turbines and jet engines.

21b-84. Hydro-Press Engineered at Home. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 106-108.

How small manufacturer of airplane parts and sheetmetal products designed and built a 750-ton press for use in their plant, when they were unable to purchase this piece of equipment.

21b-85. Shipbuilder in General Manufacturing. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 114-117.

General manufacturing activities in United Engineering Co.'s San Francisco shops since shipbuilding activities came to a halt last spring. Miscellaneous special machinery is being produced for several industries.

21b-86. New Developments in Hot Dipped Tin Plate Production. *Industrial Heating,* v. 15, Nov. 1948, p. 1940, 1942, 1944. Condensed from paper by E. F. Harris.

Modern handling methods for tinplate production.

21b-87. Irvin Works Modernization Program Effects Improved Product Quality and Processing Efficiency. *Steel,* v. 123, Nov. 22, 1948, p. 84-86.

Modernized facilities which make possible production of sheet steel in coil form up to the final operation of shearing to size at Irvin Work of Carnegie-Illinois Steel Corp. Additional slab-heating furnace; shearing equipment; 56-in. continuous pickler; sheet-coil annealing furnaces; and materials-handling equipment.

21b-88. Hotpoint Streamlines Production at Huge Chicago Plant. *Stove Builder,* v. 13, Dec. 1948, p. 46-53.

Picture story of the production of electric ranges. Press operations materials handling, enameling, drying, and assembly.

21c—Nonferrous

21c-1. Gridded Bearings. *Mechanical Engineering,* v. 70, Jan. 1948, p. 32-33.

New process developed by American Brake Shoe Co., by which centrifugally cast, Pb-Sn bronze is gridded by a simple, mechanical, mass-production method.

21c-2. Making Motor Car Radiator Cores. *Machinery* (London), v. 72, Jan. 22, 1948, p. 99-107.

Use of semiautomatic machinery.

21c-3. Brass Smelting Speeded by New Materials Handling Methods. *Steel,* v. 122, March 1, 1948, p. 100.

21c-4. Precision Method of Fabricating Makes Heavy-Duty Gridded Bearings Available at Lower Cost. *Steel,* v. 122, March 15, 1948, p. 128.

Simple method developed.

21c-5. Expanded—for Economy. *Inco,* v. 22, Spring 1948, p. 10-11.

Manufacture of "expanded" Ni-alloy screens. This type of screen is made by slitting sheets of the material to be used, then stretching and roller flattening.

21c-6. Radiator Output Increased 50% by Mechanized Processing. *Steel,* v. 122, May 3, 1948, p. 94-97.

Fully conveyerized line for building automobile radiators which is expected to save an estimated 10 man-minutes per unit on assembly operations and to reduce damage to fins. Operations include forming,

cutting and trimming, soldering, tempering, assembly, and finishing.

21c-7. Streamlined Production: Band Instruments. *Production Engineering & Management,* v. 21, May 1948, p. 61-68.

Forming, machining, joining, drilling, finishing, and inspection procedures. A special brass is the principal alloy used.

21c-8. Development of "Bromet" Tungsten Carbide Dies Aids Australian Industry. R. C. Lister and K. B. Jones. *B. H. P. Review,* v. 25, June 1948, p. 12-14.

Some details of the production of "Bromet" tungsten carbide dies, with various examples of their use.

21c-9. High Strength Bronzes; Their Development and Production. *Metal Industry,* v. 73, Sept. 17, 1948, p. 223-226.

Equipment and operations of British firm which produces high-strength bronzes and brasses for marine and aeronautical uses. Operations consist mainly of extrusion, rolling, forging, wire drawing, casting, powder metallurgy, machining, and heat treatment.

21c-10. Manufacturing Carbide Drills. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 78-81.

21c-11. Les procédés de fabrication des usines métallurgiques Suisses. (Fabrication Procedures in the Swiss Metallurgical Industry.) (Also in German.) O. H. C. Messner, *Pro-Metal,* v. 1, March 1948, p. 26-31.

Describes the above and their relationships, especially for copper alloys.

21c-12. Carbide Die Construction Accelerated by Widespread Interest in Processes for Fabricating Alloy Steels *Steel,* v. 123, Dec. 6, 1948, p. 115, 157.

Recommended procedures for the four steps usually considered, illustrated by construction of a simple draw die for the first draw operation in a deep draw job. The four steps are: carbide and proper support; diamond boring; grinding; and lapping.

21c-13. New Tooling Speeds Output of Improved Fire Extinguishers. H. H. Messenger. *Production Engineering & Management,* v. 22, Dec. 1948, p. 51-54.

Miscellaneous operations in production of copper extinguishers.

21d—Light Metals

21d-1. Aircraft Know-How Applied to Truck Aluminum Bodies. R. W. Graham. *Automotive Industries,* v. 98, Jan. 1, 1948, p. 44-45, 70.

All-aluminum truck and trailer bodies produced by using designs and assembly methods based on aircraft experiences.

21d-2. De Havilland Dove; an Attractive Feeder-Line Aircraft of All-Metal Construction. Part I: Development and Design; Fuselage Structure; Fuselage Unit Assembly. Part II. Sectional Assembly of the Cabin Portion of the Fuselage: Fuselage Rear Section and Fin. *Aircraft Production,* v. 10, Jan. 1948, p. 9-14; Feb. 1948, p. 44-51. (To be continued.)

21d-3. Alvis Leonides Design Details; Batch Production of Major Components. J. A. Oates. *Aircraft Production,* v. 10, April 1948, p. 132-138.

Production of the British radial aircraft engine, including foundry work on light-alloy parts; welding; machining; assembly operations.

21d-4. High-Speed Deep Drawing. *Steel,* v. 122, May 17, 1948, p. 87, 90, 116.

How fast press work, modern heat-treating practice, production welding, and completely conveyerized handling are used in production of 15½-gal., light-weight, brewery barrels.

21d-5. Modern Light-Alloy Engineering. *Aeroplane,* v. 74, May 21, 1948, p. 612-614.

Aspects of work in production of "Hiduminium" and "Magnuminium".

21d-6. Materials Handling and Storage of Light Alloys. James Erickson. *Light Metal Age,* v. 7, June 1948, p. 10-14.

Effect of moisture, alloying elements, storage and transport conditions.

21d-7. Ingenious Equipment Modifications Increase Production. Rupert Le Grand. *American Machinist,* v. 92, June 3, 1948, p. 90-93.

Production of Silex steam irons from Al alloy.

21d-8. A New Industry for the West Coast: Making Collapsible Tubes. *Western Metals,* v. 6, June, 1948, p. 30-31.

Production of Al tubes.

21d-9. Installing Test Sections of Aluminum Pipe. F. E. Miller. *World Oil,* v. 128, July 1948, sec. 1, p. 186-188, 190.

Special handling and welding techniques for pipe which is being used for oil in areas of high corrosion losses.

21d-10. The Shop Processing of Magnesium. H. E. Swayze. *Photoengravers Bulletin,* v. 37, July 1948, p. 18-28.

Production of magnesium, history of magnesium in photo-engrav-

ing, and characteristics of magnesium in photo-engraving.

21d-11. De l'avion a la maison. Comment les Anglais construisent a la chaine des maisons en aluminium. (From Airplanes to Houses. How the English Build Aluminum Houses on the Production Line.) Maurice Victor. *Revue de L'Aluminium,* v. 25, June 1948, p. 204-216.

Methods and equipment used by English airplane manufacturer.

21d-12. Hlinikova folie. (Aluminum Foil.) Bedrich Puchnar. *Hutnicke Listy,* v. 3, April-May 1948, p. 115-116.

Production and properties.

21d-13. Making the Functional Model in Magnesium. *Magazine of Magnesium,* Aug. 1948, p. 8-11.

Techniques for making prototypes or pilot models, and advantages.

21d-14. Northwest's Aluminum Trucks. A. M. Ingebretson. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 74-77, 102.

Manufacture of aluminum truck bodies.

SECTION XXII

JOINING AND FLAME CUTTING

22a—General

22a-1. Welding Heat Resisting Alloys for Jet Engine Construction. E. W. Harding. *Welding,* v. 15, Nov. 1947, p. 504-511.

Techniques which overcome difficulties commonly encountered when resistance welding the special nickel alloy steels. A method of calculating correct pressures for seam welding. The process for joining mild steel to stainless steel.

22a-2. Choose the Right Electrode; a Guide to Properties and Applications. (Concluded.) W. D. Waller. *Welding,* v. 15, Nov. 1947, p. 521-529.

Electrodes for copper-bearing steels; austenitic stainless electrodes; weld tests; lime-ferritic electrodes. Electrode prices compared; other factors pertinent to selection of the right size and type of electrode for a specific job.

22a-3. Resistance Welding in Mass Production; Principles of Seam Welding. A. J. Hipperson and T. Watson. *Welding,* v. 15, Nov. 1947, p. 530-534.

Fundamentals of the process, as well as variables such as pressure, current, track width, and speed.

22a-4. Oxygen Cutting; Suitable Fuel Gases. E. Seymour Semper. *Welding,* v. 15, Nov. 1947, p. 535-536.

22a-5. Oxy-Gas Cutting; Various Gases Compared With Acetylene. A. H. Taylor and T. Bound. *Welding,* v. 15, Nov. 1947, p. 536-543.

Results of a series of tests on mild-steel bars using acetylene, propane, propane enriched with ether, coal gas, and coal gas enriched with ether.

22a-6. The Dissociation of Nitrogen in the Welding Arc. J. D. Fast. *Philips Research Reports,* v. 2, Oct. 1947, p. 382-398.

For temperatures from 5000 to 10,000° K., the dissociation is computed on the basis of spectroscopic data for three different values of the dissociation energy. 21 ref.

22a-7. Here's a New Way to Make Things Tough for a Caterpillar Tractor. Ray Larson. *Weld,* v. 3, Dec. 1947, p. 6-8.

Setup for automatic hard facing of Caterpillar tractor track rollers.

22a-8. Joining and Welding. *Steel,* v. 122, Jan. 5, 1948, p. 202, 204, 207-209.

Brief reviews of new developments: Pressure Welding Used to Join Steam Piping, by R. A. Kubli; Notes Rapid Progress in Structural Welding, by LaMotte Grover; Tremendous Savings Realized Through A.C. Arc Welding, by C. P. Croco; Modern Methods Improve Fastener Strength, Accuracy, by Harry O. McCully; Inert-Gas Shielded Arc Welding Applicable to Many Metals, by H. T. Herbst; New Applications Noted for Submerged Melt Welding, by Norman G. Schreiner; Inert-Arc Welding Affords Wider Range and Flexibility, by G. O. Hoglund; Demand for Double-Duty Fastening on the Increase, by George A. Tinnerman; Use of Low-Hydrogen Welding Electrode Gains Steadily, by Pierre Champion; Arc Welding Applied to New Metals Creates Problems, by Robert E. Kinkead; Sees Need for Simplified Resistance Welding Controls, by G. N. Sieger; Fracture Bend Tests Used to Evaluate Weldability, by John J. Chyle; Various Welding Methods to Affect Parts Design, by Joseph W. Meadowcroft; Drive Large Rivets Cold Using Controlled Safe Pressures, by W. E. Fowler, Jr.; New Alloys and Fluxes Improve Aluminum Brazing, by H. A. Huff; Flash Butt Welding Applied to Heat Resisting Alloys, by I. A. Oehler; More Versatility Noted for Arc Welding Process, by A. N. Kugler; Metals Placed Strategically in Welded Machine Tool Designs, by A. F. Davis; Inert-Gas Shielded Arc Welding Available for Mass Production, by H. O. Jones; Submerged Arc and Inert-Gas Welding Improved, by R. B. Lincoln; Resistance Welding Expands Through New Developments, by Fred Johnson; Investigations Help Fabricators Select Steels for Spot Welding, by J. Heuschkel.

22a-9. 1947 Found Welding Again Winning Rightful Place. T. B. Jefferson. *Welding Engineer,* v. 33, Jan. 1948, p. 33-35, 79.

Review of developments.

22a-10. Production Methods of Low-Temperature Silver Alloy Brazing. A. M. Setapen. *Steel Processing,* v. 33, Dec. 1947, p 761-765.

22a-11. The ABC's of Silver Alloy Brazing. W. J. Van Natten. *Iron Age,* v. 161, Jan. 8, 1948, p. 51-55.

Fundamentals. The characteristics of ten well-known silver brazing alloys. Fluxing and heating; joint design and part preparation.

22a-12. How to Handle and Take Care of D.C. Arc Welders. John Morrill. *Factory Management and Maintenance,* v. 106, Jan. 1948, p. 122-125.

Practical recommendations.

22a-13. Rail Welding; Success of New Development. *Welding,* v. 15, Dec. 1947, p. 571-572.

Oxy-acetylene welding of copper conductors to rails with no harmful effect on the rail metal.

22a-14. Consider These Factors When Welding High-Temperature Alloys. C. G. Chisholm. *Industry and Welding,* v. 21, Jan. 1948, p. 30-32, 59-61.

Previously abstracted from *Steel,* v. 121, Dec. 29, 1947, p. 54-56, 58, 60. (Presented at 28th Annual Conference of A.W.S.) See 22-783, R.M.L., v. 4, 1947 (*Metals Review,* Jan. 1948).

22a-15. Welding for Science and Industry. *Industry and Welding,* v. 21, Jan. 1948, p. 40-42, 44, 64-65.

Use of welding and cutting in repair, maintenance, and construction of exhibits at Chicago's Museum of Science and Industry.

22a-16. Designing for Resistance Welding. Ernie Lauter. *Industry and Welding,* v. 21, Jan. 1948, p. 62-64.

Miscellaneous cost saving ideas.

22a-17. Heliarc Welding for the Difficult-to-Weld Metals and Alloys. H. T. Herbst and F. J. Pilia. *Product Engineering,* v. 19, Jan. 1948, p. 127-131.

Joint constructions, limitations on thicknesses of materials, weld strengths relative to strengths of base metals, and other information for use in designing parts and articles for fabrication by Heliarc welding. Comparison with other welding methods.

22a-18. Copper Furnace Brazing. *Machinery* (London), v. 71, Dec. 18, 1947, p. 683-688.

Equipment and methods used in large-scale industrial operations. Based on work in the U. S.

22a-19. How to Use Arc Welding Electrodes. H. O. Westendarp, Jr. *Steel Processing,* v. 34, Jan. 1948, p. 20-22, 44.

The four fundamentals of welding technique which affect the deposition of weld metal: current setting, length of arc, angle of electrode, and speed of travel.

22a-20. Adhesives for Gluing Thin Metal Sheets. Francis A. Westbrook. *Steel Processing,* v. 34, Jan. 1948, p. 26-28.

Synthetic resin adhesives for joining thin metal sheets have become a production tool. Originally designed for aluminum and other light metals, the adhesives will now bind carbon and stainless steel sheets with greater bonding power than rivets.

22a-21. Welding on the Farm. *Linde Tips,* v. 27, Jan. 1948, p. 5-7.

Miscellaneous repair and fabrication techniques for the farm welding shop.

22a-22. Here Are the Fluxes. *Linde Tips,* v. 27, Jan. 1948, p. 20-21.

When and how to use the various types.

22a-23. Inert-Gas Shielded-Arc Welding. Part I. What It Is—Advantages—When to Use It—Apparatus. *Sheet Metal Worker,* v. 39, Jan. 1948, p. 93-95.

22a-24. Some Properties of Soft Solders. P. Hydrean, *Sheet Metal Worker,* v. 39, Jan. 1948, p. 103-105.

Choice of the best type for the particular job.

22a-25. Resistance Welding in Mass Production; Hot Riveting Principles and Applications. A. J. Hipperson and T. Watson. *Welding,* v. 16, Jan. 1948, p. 30-38.

Twelfth of series deals with the scope of the hot riveting process, its advantages, types of rivet-head shape, suitable arrangement of the workpiece, and equipment used.

22a-26. Inert-Gas Shielded-Arc Welding. H. T. Herbst. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 4.

Views on the newest method of fusion welding now in commercial use.

22a-27. Welding High-Temperature Alloys. *Product Engineering,* v. 19, Feb. 1948, p. 138-139. Condensed from "Welding Characteristics of Various High-Temperature Alloys", by C. G. Chisholm.

Previously abstracted from *Steel,* v. 121, Dec. 29, 1947, p. 54-56, 58, 60. (Presented at annual meeting of A.W.S., Chicago, Oct. 21, 1947.) See item 22-783, R.M.L., v. 4, 1947.

22a-28. Short-Cut Estimation of Welded Process Vessels. Harlan How.

Chemical Engineering, v. 55, Jan. 1948, p. 122-126.

When price information on welded vessels is unavailable, the charts given will assist in making rough cost estimates covering gas cutting, plate rolling, edge preparation, welding labor, welding rod, and flux for butt and fillet welds of U-69. U-70, and A.P.I.-A.S.M.E. quality in carbon steel, chromium nickel steel, stainless and nickel-clad steels, and Cu-Si alloys; several kinds of nozzles; and the machining of plate flanges and heads. Some data are applicable to weldments other than vessels.

22a-29. Maintenance of Welding Machines. C. A. Lehton and H. F. Worcester. *Western Machinery and Steel World,* v. 39, Jan. 1948, p. 85-87.

At Ryan Aeronautical Co., San Diego.

22a-30. Shape-Welding by the Submerged-Melt Welding Process. J. A. Kratz. *Welding Journal,* v. 27, Jan. 1948, p. 5-10.

Methods used in mechanized shape welding—that is, the joining of pieces of an assembly in which the direction of the weld changes as the welding action proceeds. (Presented at 28th Annual Meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22a-31. Survey of Automatic Arc and Gas Welding Processes as Used in the Automotive Industry; A Committee Report. *Welding Journal,* v. 27, Jan. 1948, p. 27-35.

Brief, general discussion of submerged arc welding; automatic shielded metal-arc welding; automatic bare metal-arc welding; automatic carbon-arc welding; automatic atomic-hydrogen welding; automatic inert-gas shielded metal-arc welding; and automatic oxy-acetylene welding.

22a-32. Multiple Flame Pressure Welding Process. N. H. Cuke. *Welding Journal,* v. 27, Jan. 1948, p. 39-47.

"Closed-butt" and "open-butt" methods, with particular emphasis on the latter method. 13 ref. (Presented at 28th Annual Meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22a-33. Welded Fabrication. J. R. Stitt. *Welding Journal,* v. 27, Jan. 1948,p. 48-51.

Various stress patterns established during an arc welding process. (Presented at 28th Annual Meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22a-34. Welding a Roto-Clone Impeller. Harrington Powers. *Welding Journal,* v. 27, Jan. 1948, p. 51-52.

22a-35. Structural Failure of a Riveted Ship. E. M. MacCutcheon. *Welding Journal,* v. 27, Jan. 1948, p. 52-54. Reprinted from *Proceedings of the Merchant Marine Council,* May 1947.

Comparison with certain welded ship failures.

22a-36. Air Reduction's New Apparatus Research Laboratory Developing Additional Uses for Industrial Gases. *Welding Journal,* v. 27, Jan. 1948, p. 73-74.

The injection of industrial gases into molten metals, the oxy-acetylene cutting of steel while the metal is still hot and surface conditioning of stainless steel are examples of the laboratory's developments on which applied research is being conducted.

22a-37. Pressure Vessel Research. *Welding Journal,* v. 27, Jan. 1948, p. 5s-6s.

Proposed research of the Pressure Vessel Research Committee of the Welding Research Council.

22a-38. Note on the Influence of $CaCO_3$ Additions to the Electrode Coating on the Composition of the Arc Atmosphere. Manley W. Mallett. *Welding Journal,* v. 27, Jan. 1948, p. 28s-29s.

Values for different commercial and experimental electrodes.

22a-39. Welding Jig for Salvaging Drilled Parts. Donald A. Baker. *Machinery,* v. 54, Feb. 1948, p. 179.

22a-40. Examining Cost Factors and Solving Important Problems at International Harvester With Welding Research. *Industry and Welding,* v. 21, Feb. 1948, p. 26-29, 63.

22a-41. Application and Procedures for E 6013 and XX 13 Electrodes. Lew Gilbert. *Industry and Welding,* v. 21, Feb. 1948, p. 30-32, 34, 39.

Useful data based on exhaustive production tests.

22a-42. Saving Money on Tools and Fixtures; Part I. E. H. Girardot. *Industry and Welding,* v. 21, Feb. 1948, p. 48, 50, 52-55.

Repair jobs done with oxy-acetylene, resistance and arc welding.

22a-43. Adhesives for Metalworking. H. E. Linsley. *American Machinist,* v. 92, Feb. 12, 1948, p. 107-118.

Properties and applications with particular reference to such processes as Pliobond, Cycle-Bond, Redux, Metlbond, Plycozite, Plastilock, and Reanite.

22a-44. Inert-Gas Shielded-Arc Welding Method. H. T. Herbst. *Light Metal Age,* v. 6, Feb. 1948, p. 20-24.

Application to a large variety of metals. Joint types—with and with-

out welding; rods; selection of welding current; welding jigs; starting the arc; starting and stopping the weld seam; shape welding; weld packing; cleaning the metal prior to welding.

22a-45. New Techniques in Glass-to-Metal Sealing. Joseph A. Pask. *Proceedings of the I.R.E.,* v. 36, Feb. 1948, p. 286-289.

The new techniques described include accurate and controlled oxidation of the metal, and the powder-glassing method of making seals. The accompanying experimental data refer to Kovar, since most of the laboratory work has been on glass-to-Kovar seals. Data are presented for oxidation at a number of controlled temperatures and varying times. Hypotheses on the function of H_2 baking of Kovar, adherence of glass to Kovar, and nature of the oxidation process are presented.

22a-46. Instruments for the Measurement of the Main Variables in Resistance Welding Machines. *Welding Research,* v. 1 (Bound with *Transactions of the Institute of Welding,* v. 10), Dec. 1947, p. 19-24.

First interim progress report of the FR. 5 Committee of the British Welding Research Association on development of devices for measuring current, pressure, and time in resistance welding machines. Satisfactory instruments of a simple, accurate, and sturdy nature have been developed for the measurement of secondary current and welding time. Work is continuing on the design of a suitable current transformer and an insert, either of which can be used in conjunction with the impulse ammeter. The more difficult problem of the measurement of dynamic pressure during welding is continuing to receive attention.

22a-47. Stability of Power Supply for the Electric Arc Under Welding Conditions. (In Russian). V. P. Nikitin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences). Oct. 1947, p. 1315-1322.

Proposes a series of equations for calculating the conditions required in order to maintain a stable power supply.

22a-48. Use of Redux Adhesives for Bonding Metal. M. Martin. *U. S. Atomic Energy Commission,* MDDC-1166. May 20, 1947, 2 pages.

Methods for use of above thermosetting synthetic resins and results obtained.

22a-49. Sealing of Metals to Ceramics With Particular Reference to Glass, 1935-1939. *Science Museum Library,* South Kensington, London, No. 520, 7 pages.

An unannotated bibliography. 116 ref.

22a-50. Electric Resistance Welding; a Bibliography of the Literature From January, 1936 to June, 1947, With Index and Topical Synopses. Harold S. Card. *The Author,* Cleveland, 1947, 22 pages.

22a-51. Arc Welding and Resistance Welding. P. J. Rieppel. *Metals Review,* v. 21, Feb. 1948, p. 5-7, 9.

A review of recent literature with references to A.S.M.'s "Review of Current Metal Literature."

22a-52. New Welding Equipment. *Metals Review,* v. 21, Feb. 1948, p. 11, 13, 15, 17, 19.

Reviews 127 new products and processes announced by manufacturers during past six months.

22a-53. Use of Conduction Heating for Soldering Brass Without Discoloration. *Industrial Heating,* v. 15, Feb. 1948, p. 246, 248.

Ingenious method of providing localized heat for soldering operations. The method involving conduction heating has the advantages of induction heating and is achieved at a very low cost.

22a-54. 275 Welded Tanks Per Day at Eaton. Gerald Eldridge Stedman. *Welding Engineer,* v. 33, March 1948, p. 33-35.

Production methods using ingenious fixtures.

22a-55. Fixtures for Automatic Torch Brazing. W. E. Johnson and H. A. Huff. *Welding Engineer,* v. 33, March 1948, p. 42-43.

A conveyer belt and a turntable method for increasing production of various assemblies.

22a-56. Sheet Metal to Switchboards. Fred M. Burt. *Welding Engineer,* v. 33, March 1948, p. 46-48.

Describes and illustrates spot welding for small parts and arc welding for large assemblies.

22a-57. That Problem of Power Factor. John H. Blankenbuehler. *Welding Engineer,* v. 33, March 1948, p. 58-60.

Defines power factor and tells how to reduce it when welding load is involved.

22a-58. Hard Facing by Metal Spraying. *Welding Engineer,* v. 33, March 1948, p. 62, 64.

"Sprayweld"—a new process developed to apply thin layers of hard facing to a base metal.

22a-59. The Story of the Welding Symbols. Leon C. Bibber. *Welding Journal,* v. 27, Feb. 1948, p. 101-107.

The development of welding symbols over the past 20 years. The purpose of A. W. S. symbols and how they may be used.

22a-60. Mechanized Inert-Gas Shielded-Arc Welding. H. T. Herbst. *Welding Journal,* v. 27, Feb. 1948, p. 111-117.
Applications and methods. (Presented at 28th Annual Meeting, A. W. S., Chicago, week of Oct. 19, 1947.)

22a-61. Standardized Welded Beam Connections and Special Rigid Frame Details of New Airco Laboratory. La-Motte Grover. *Welding Journal,* v. 27, Feb. 1948, p. 130-135.
Use in construction of Air Reduction's new laboratory at Murray Hill, N. J. Welding details are based on "Manual of Design for Arc-Welded Steel Structures", compiled by the writer and published in 1946 by Air Reduction Co. (Presented at 28th Annual Meeting, A. W. S., Chicago, week of Oct. 19, 1947.)

22a-62. Rigid Structures. Martin P. Korn. *Welding Journal,* v. 27, Feb. 1948, p. 135.
A discussion of the use of the phrase "all-welded rigid design".

22a-63. Volume Output With Heliarc Welding. *Production Engineering & Management,* v. 21, March 1948, p. 56.
Outlines the process and its advantages in general terms and illustrates it with a specific example.

22a-64. Furnace Fixture for Maintaining Welding Preheat. W. R. Patterson. *Iron Age,* v. 161, March 11, 1948, p. 141-142.
Present day welding requirements often make it necessary to weld complicated parts using materials that are sensitive to hardening. The adjustable articulated electric welding furnace was developed to overcome some of the difficulties associated with such work. While it was designed primarily to handle a specific item, the principles involved apply to many other welding jobs.

22a-65. The Physics of Arc Welding. *Engineering,* v. 165, Jan. 9, 1948, p. 38. Condensed from Technical Report, Reference Z/T61. "The Transfer of Material, Temperature and Stability in the Electric Welding Arc. A Résumé of Published Information", British Electrical and Allied Industries Research Assoc., 15 Savoy-Street, London, W.C.2.

22a-66. A Survey of Established Processes for the Jointing of Metals. D. F. Hewitt. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 363-366, 372.
First of a series in which principles and practical details of the various processes now in common use will be discussed. (To be continued.)

22a-67. Rapid Wetting Test for Solders. *Bell Laboratories Record,* v. 26, Feb. 1948, p. 63.
Twisted pairs of wires are immersed vertically in a bath of molten solder and the height of capillary rise between the wires in 15 sec. is observed. This height depends on temperature and composition of the alloy, diameter and thermal conductivity of the wires, their twist and cleanliness, nature of the flux, and time of immersion. By maintaining other factors constant, variation in wettability as a function of any one factor can be readily determined.

22a-68. Here's How York Does It. Albert Anderson and Eli Anderson. *Industry and Welding,* v. 21, March 1948, p. 26-29, 57-58, 60.
How procedure data is developed and transmitted to welding departments. Applications on silicon bronze, Cu-Ni, stainless, and carbon steel. Procedures are given for brazing, inert-arc, and resistance welding, plus grinding and polishing. Emphasis is given to use of positioning equipment, rotating fixtures, and quick acting clamps in the manufacture of industrial refrigeration and air-conditioning equipment.

22a-69. Saving Money on Tools and Fixtures. Part II. E. H. Girardot and D. W. Puffer. *Industry and Welding,* v. 21, March 1948, p. 30-32, 34.
Tools fabricated by the "composite" method at G. E., including those with hardening and machining done prior to welding, and those completely assembled before machining.

22a-70. Designing for Resistance Welding. Ernie Lauter. *Industry and Welding,* v. 21, March 1948, p. 90-92.
Seam welding consisting of making a series of spot welds by means of one or two rotating-wheel electrodes without opening the wheels between spots.

22a-71. Standard Annular Ring Projection for Resistance Welding. O. C. Frederick. *Steel Processing,* v. 34, Feb. 1948, p. 88-89, 96.
Recommended designs and preferred dimensions.

22a-72. Welding and Fabrication of High-Temperature Alloys. C. G. Chisholm. *Welding Journal,* v. 27, March 1948, p. 217-223.
Welding processes and techniques applied to several superalloys in the manufacture of parts for gas turbine rotors, jet nozzles, and combustion chambers. (Presented at 28th

annual meeting, A. W. S., Chicago, week of Oct. 19, 1947.)

22a-73. French Specifications for Gas Welding Rods. *Welding Journal,* v. 27, March 1948, p. 223-224.

Condensed from specifications issued by French Committee on Standardization of Welding, Sept. 1947.

22a-74. Shape Welding by the Submerged Melt Welding Process. J. A. Kratz. *Steel Processing,* v. 34, March 1948, p. 141-143, 146-147.

Previously abstracted from *Welding Journal,* v. 27, Jan. 1948, p. 5-10. See item 22a-30.

22a-75. Stability of the Power Source for the Electric Arc During Welding. (In Russian.) V. P. Nikitin. *Avtogennoe Delo* (Welding), Nov. 1947, p. 13-15.

Mathematical calculations for determination of conditions. The equations are interpreted graphically.

22a-76. X-Ray Investigation of the Welding-Arc Zone, While Operating Under Flux. (In Russian.) N. G. Ostapenko and B. I. Medovar. *Avtogennoe Delo* (Welding), Nov. 1947, p. 16-20.

An apparatus for the investigation and typical results. Determination of the ratio between the part of the arc submerged in the base metal and the part outside and adjacent to the electrode. This ratio is believed to be related to factors affecting the quality of the welds.

22a-77. The "Elasticity" of a Welding Arc Formed Under Flux. (In Russian.) N. G. Ostapenko. *Avtogennoe Delo* (Welding), Dec. 1947, p. 5-8.

Ability to decrease or increase the arc length without interruption—that is, stability. The absolute value of the length is shown to be related to chemical composition of the flux. The induction of the welding circuit influences the maximum arc length only slightly.

22a-78. Methods of Control of Spot Welding. (In Russian.) O. S. Balkovets. *Avtogennoe Delo* (Welding), Dec. 1947, p. 9-14.

Incomplete penetration may be detected nondestructively only during transition into the fused state. It may be detected and prevented only by direct control of temperature conditions in the weld zone or by observation of accompanying volumetric changes. A dilatometric method for the latter is proposed. 14 ref.

22a-79. Metal to Wood Bonding. Jac. H. Tigelaar. *Proceedings of the First National Meeting, Forest Products Research Society* Madison, Wis., 1948, p. 87-94; discussion, p. 94.

Adhesive bonding of a thin sheet of metal to wood or plywood, forming a product known as "Plymetl". Comparative stiffness factors of sheet aluminum, sheet steel, plywood, and plywood faced on one and on both sides with metal. Various bonding methods. 18 ref.

22a-80. Soot-Blower Jet Tubes Manufactured by Arc Welding. E. F. Gill. *Welding,* v. 16, Feb. 1948, p. 48-52.

Described and illustrated.

22a-81. Argonarc Welding; A Review of Progress. R. R. Sillifant. *Welding,* v. 16, Feb. 1948, p. 53-60.

Surveys historical development of argonarc process and traces progress of work both in the U. S. A. and in Great Britain. Line of future advances. 24 ref.

22a-82. Resistance Welding in Mass Production; Electrodes and Jigs for Hot Riveting. A. J. Hipperson and T. Watson. *Welding,* v. 16, Feb. 1948, p. 76-80.

Types of electrodes and design of jigs.

22a-83. Welding in the Development of Jet Propulsion Engines. H. E. Lardge. *Transactions of the Institute of Welding,* v. 11, Feb. 1948, p. 15-24.

The part played by various welding and allied processes in the manufacture and development of sheet metal work for engines with single-stage centrifugal compressors and single-stage turbines. Various welded assemblies are illustrated. (Presented to meeting of Institute of Welding, London, Feb. 26, 1948.)

22a-84. Review of Flame Cutting Developments Past, Present and Future. R. E. Dore. *Transactions of the Institute of Welding,* v. 11, Feb. 1948, p. 25-34.

(Presented to North London Branch, Institute of Welding, March 10, 1947.)

22a-85. Accumulator Applications to Welding Equipment. H. A. Vander Kaay. *Applied Hydraulics,* v. 1, Feb. 1948, p. 22-23, 32.

Use of pressure accumulators in hydraulic systems.

22a-86. Bonding of Thin Metal Sheets by Synthetic Resin Adhesives. Francis A. Westbrook. *Machinery Lloyd* (Overseas Edition), v. 20, Feb. 28, 1948, p. 74-78.

The two basic principles of adhesion—mechanical and specific. Outlines the process and presents comparative data on shear strength of Alclad joints made with Redux ad-

hesive alone, with rivets alone, and with a combination of the two, for two thicknesses and after different exposure periods and conditions. Strengths of joints between various metal combinations; and ultimate shear strengths of Redux joints for various overlaps and metal thicknesses.

22a-87. Inert-Gas Shielded-Arc Welding Broadens Its Applications. H. O. Jones and H. A. Huff, Jr. *American Machinist,* v. 92, March 25, 1948, p. 92-95.

For hard-to-weld metals, as well as for special applications on ordinary materials, Heliwelding is highly efficacious.

22a-88. Producing Diesel Engine Turbosuperchargers. F. R. Ericson. *Iron Age,* v. 161, March 25, 1948, p. 72-77.

Step-by-step description of the fixturing and welding of the turbine parts, including the high-temperature alloy buckets, shows the accuracy to which welded fabrications can be held. The milling operations in producing the buckets from solid bar stock.

22a-89. Running Your Own Shop? Part II. Ray T. Nicholas. *Industry and Welding,* v. 21, April 1948, p. 38-40, 42.

The importance of good equipment and the variety required for a welding job shop. Also discusses the hiring and training of personnel.

22a-90. Fabrication of a Steam-Heated Copper Roll. *Welder,* v. 17, Jan.-March 1948, p. 4-6.

Required welding of copper to mild steel.

22a-91. Fabrication as Applied to Switchgear. A. E. Fawcett. *Welder,* v. 17, Jan.-March 1948, p. 7-10.

Fabrication of large electrical switches.

22a-92. Electric Arc Welding as Applied to Trackwork. N. W. Swinnerton. *Welder,* v. 17, Jan.-March 1948, p. 11-13.

22a-93. Spotlight on Arc Welding. Part III. Edwin Danks & Company (Oldbury) Limited, Oldbury, Staffs. *Welder,* v. 17, Jan.-March 1948, p. 14-17.

Procedures and equipment of above British firm for manufacture of heavy tanks.

22a-94. E. F. B. Fred M. Burt. *Welding Engineer,* v. 33, April 1948, p. 40-43.

Electric-furnace brazing, to join steel stampings and other components into various parts. Advantages and procedures of the process.

22a-95. Welding the Giants. L. J. McDonough. *Welding Engineer,* v. 33, April 1948, p. 51-53.

Facts on reducing production costs of heavy machinery through use of arc welding.

22a-96. New Tricks Learned in Railroad Maintenance. Arthur L. Havens. *Welding Engineer,* v. 33, April 1948, p. 54-57.

How flame cutting and welding are being used in a locomotive repair shop.

22a-97. Spot Welded Window Screens. Walter Rudolph. *Welding Engineer,* v. 33, April 1948, p. 59.

Use of spot and projection welding in mass production of screen and storm sash.

22a-98. Railroads and the American Welding Society. L. E. Grant. *Railway Mechanical Engineer,* v. 122, April 1948, p. 76-77.

Relations between the Society, which has been largely responsible for advance of welding techniques and expansion of applications, and the railroads which have long benefited from the art.

22a-99. How Brazing Methods Affect Design of Details. S. DeDomenico and A. Squire. *Product Engineering,* v. 19, April 1948, p. 86-91.

Comparison of different techniques of torch, resistance, bath, furnace, and induction brazing. Method used affects selection of materials, design of details, and properties of brazed joints.

22a-100. The Story of Welding. W. P. Gillingham. *Compressed Air Magazine,* v. 53, April 1948, p. 78-84.

Historical, but with major emphasis on recent developments.

22a-101. Kinetic-Energy Storage for Resistance Welding. Thomas J. Crawford. *Welding Engineer,* v. 33, April 1948, p. 36-39.

A new system of d.c. supply for spot, projection, or flash welding.

22a-102. Resistance Welding in Mass Production; Flash and Butt Welding Principles. A. J. Hipperson and T. Watson. *Welding,* v. 16, March 1948, p. 121-125.

One of a series of review articles.

22a-103. Inert-Gas Shielded-Arc Welding. (Concluded.) *Sheet Metal Worker,* v. 39, April 1948, p. 66-68.

Setting the welding current, selecting electrodes, joint design, proper jigging, use of back-ups, and making the weld.

22a-104. The Processing of Aluminum-Steel Bonded Assemblies. M. G. Whitfield and V. Sheshunoff. *Modern Metals,* v. 4, April 1948, p. 13-15.

Some applications, methods of processing, design factors, necessary equipment, heat treatment, as well as brazing these metals.

22a-105. Local Elastic and Plastic Deformation During the Welding of Rods Onto Sheets. (In Russian.) N. N. Prokhorov, N. V. Shiganov, and A. V. Mordvinsteva. *Avtogenno Delo* (Welding), Feb. 1948, p. 12-15.

Results of investigations show that deformation often takes place in cooling, resulting in cracks. The rate and amount of this deformation increases with increased plate width. Proposes cooling the zone adjacent to the weld by means of water.

22a-106. Resistance Welding in Mass Production; Butt and Flash-Butt Welders. A. J. Hipperson and T. Watson. *Welding,* v. 16, April 1948, p. 145-151, 162.

Different types and their operation. Control of the variables affecting quality.

22a-107. The Comparative Performance of Air-Supplied Welding Helmets. Merril Eisenbud and Leslie Silverman. *Welding Journal,* v. 27, April 1948, p. 287-289.

The performance characteristics of three types of supplied-air welding helmets were studied. The plenum method of supplying air provided a protective efficiency of over 99% as compared to a maximum of 73% for the next best design. The plenum helmet was likewise more satisfactory because of lower operating pressure and less noise.

22a-108. New Applications of Inert-Arc Welding. R. W. Tuthill. *Welding Journal,* v. 27, April 1948, p. 299-301.

(Presented at 28th Annual Meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22a-109. Maintenance of Resistance Welding Equipment. F. R. Woodward. *Welding Journal,* v. 27, April 1948, p. 301-303.

Recommendations based on experience. (Presented at meeting of Detroit Section of A.W.S., Jan. 9, 1948.)

22a-110. Periodic Inspection and Preventive Maintenance of Arc-Welding Equipment. Volney H. Speck. *Welding Journal,* v. 27, April 1948, p. 303-304.

Maintenance and care of a.c. and d.c., single-operator, arc welding units of the 150, 200, 300, 400, and 600-amp. types. (Presented at meeting of Detroit Section A.W.S., Jan. 9, 1948.)

22a-111. Seam Weld Attachments for Spot Welders of the Rocker Arm Type. W. S. Horth. *Welding Journal,* v. 27, April 1948, p. 305-306.

22a-112. Explosive Rivets; Recent Developments in American Automobile Construction. H. C. Hendrick. *Automobile Engineer,* v. 38, April 1948, p. 141-142.

22a-113. Preloaded Bolt Betters Design. *SAE Journal,* v. 56, April 1948, p. 20-22. Based on "Applications, Materials, and Specifications of Bolts", by W. C. Stewart.

Preloading a bolt and maintaining that tension throughout the life of the joined part helps the bolt perform its clamping function better and makes it last longer. (This paper will be published in full in *SAE Quarterly Transactions).*

22a-114. Why, Where, How You Can Use Multi-Torch Stack Cutting. *Industry and Welding,* v. 21, May 1948, p. 40-42, 44, 46.

22a-115. Bonding Rubber to Die Castings. John Gerstenmaier. *Die Castings,* v. 6, May 1948 p. 25-26, 51.

Standard procedures.

22a-116. Selecting a Resistance Welder. Ben R. Askew. *Southern Power and Industry,* v. 66, April 1948, p. 62-64, 122, 124, 126.

Recommendations as applied to various types of jobs.

22a-117. A Survey of Established Processes for the Jointing of Metals. (Continued.) D. F. Hewitt. *Sheet Metal Industries,* v. 25, April 1948, p. 771-776, 782; May 1948, p. 991-994, 1004.

April installment covers automatic and semi-automatic processes; sweat soldering; machine soldering; hard solders; silver solders; phosphorus-bearing brazing alloys; brazing brasses; copper for brazing; torch brazing; furnace brazing; dip brazing; electrical-resistance brazing; high-frequency induction brazing; salt-bath brazing; aluminum brazing; design of joints for brazing; and bronze welding. May installment deals with various types of fusion welding, including gas and arc welding of the different metals. (To be continued.)

22a-118. The Basic Principles of Resistance Welding and a Description of Some Modern Machines. C. E. Slade. *Sheet Metal Industries,* v. 25, April 1948, p. 995-1004.

(Presented at joint meeting of Institute of Welding — London Branch—and Foremen and Staff Mutual Benefit Society—Romford and Dagenham District.)

22a-119. Flash Butt Welding; Experimental Spar-Bracing Tubes for the

Bristol Type 167 Aircraft. Part I. The Structure: Exploratory Welding Experiments. S. G. E. Nash, H. Brooks, and M. A. Garnett. *Aircraft Production,* v. 10, May 1948, p. 167-171.

The problem, and selection and weld testing of materials. (To be continued.)

22a-120. **Silicon Bronze Welded to Mild Steel.** H. Hose. *Welding Engineer,* v. 33, May 1948, p. 51.

An example of how aluminum-bronze electrodes are employed in the welding of dissimilar metals is a large condenser. The tube sheets were made of Everdur 1010 silicon-bronze, plate and welded to the A-70 mild-steel sheet with 5/32-in. aluminum-bronze electrodes having a tensile strength of 60,000 to 70,000 psi.

22a-121. **Weldments Show Their Advantages in Widely Diverse Designs.** *Electrical Manufacturing,* v. 41, May 1948, p. 119-124.

These papers, prepared for James F. Lincoln Arc Welding Foundation contest, show a wide variety of technical situations in which weldments helped to find solutions. Fan-cooled Stator for A-C Motor, by C. R. Sutherland; Redesign of a Dough Sheeting Machine, by Joseph Boehler; Redesign Results in Fewer Parts, Increased Plant Capacity, by Ralph C. Schiring; Welding Eliminates Corrosion in a Commercial Laundry Washer, by Frank A. Gerlach; Development of a Composite Welded Frame for an Open-Back Inclinable Press, by Robert Soman; and Added Safety Through Welding in a Pressure-Jacketed Mixer, by Eugene Schmierer.

22a-122. **Joints for Thin Wall Tubes.** J. E. York. *Heating and Ventilating,* v. 45, May 1948, p. 84-88.

Joints used for connecting thin wall tubes made of copper, brass, steel, monel, and other alloys.

22a-123. **D. C. Resistance Welding Utilizing Kinetic Energy Storage.** Thomas J. Crawford. *Welding Journal,* v. 27, May 1948, p. 359-362.

Devices and apparatus developed by the resistance welding industry for reducing peak-power demand and details of a new d.c. generator operated by a three-phase motor for meeting this problem. (Presented at 28th annual meeting, A.W.S., Chicago, Oct. 18-22, 1947.)

22a-124. **Power Supply for Inert-Arc Welding.** A. U. Welch. *Welding Journal,* v. 27, May 1948, p. 376-378.

Advantages and disadvantages of two types developed to permit inert-arc welding with moderate power voltage. (Presented at A.I.E.E. winter general meeting, Jan. 29, 1948.)

22a-125. **Welding Problems; The Function of the British Welding Research Association.** H. G. Taylor. *Iron and Steel,* v. 21, May 1948, p. 150.

22a-126. **Automatic Welding With a Three-Phase Arc.** (In Russian.) G. P. Mikhailov. *Avtogennoe Delo* (Welding), v. 3, March 1948, p. 18-21.

Conditions of operation using the open arc or under flux. Advantages as compared to single-phase arc welding. Different circuits applicable to this type of welding.

22a-127. **Measurement of Secondary Current, Voltage and Electrode Load Cycles for Spot Welding Machines.** G. E. Bennett and H. E. Dixon. *Welding Research* (Bound with *Transactions of the Institute of Welding,* v. 11) v. 2, April 1948, p. 26r-36r.

Important variables during the production of spot welds.

22a-128. **Soldering Aluminum Alloys.** Frank W. Thomas and Eli Simon. *Electronics,* v. 21, June 1948, p. 90-92.

Experiments indicate that some of the problems in soldering aluminum can be solved by vibrating the solder at an ultrasonic rate while applying it. By this method, the oxide coating is disrupted and alloying occurs before reoxidation can take place.

22a-129. **Three-Phase Balanced Load Resistance Welding; Reduction of Power Demands and Costs.** C. A. Burton. *Welding,* v. 16, May 1948, p. 184-192.

System and its advantages; equipment used; and cost savings.

22a-130. **Cold Welding; New Developments.** *Welding,* v. 16, May 1948, p. 193-194.

Recent work indicates possibilities of cold welding technique.

22a-131. **Mechanized Inert-Gas Shielded-Arc Welding; Technique and Equipment.** H. T. Herbst. *Welding,* v. 16, May 1948, p. 195-202, 210.

Previously abstracted from *Welding Journal,* v. 27, Feb. 1948, p. 111-117. See item 22a-60, 1948.

22a-132. **Resistance Welding in Mass Production; Flash Welding Dies and Fixtures.** A. J. Hipperson and T. Watson. *Welding,* v. 16, May 1948, p. 211-220, 225.

The various considerations governing the most efficient die designs for different types of components to be welded.

22a-133. **Welding's Future?** Harry C. Boardman. *Industry and Welding,* v. 21, June 1948, p. 30-32, 34.

22a-134. Your Pipe Welding up to Date? Carbon Steel; Aluminum; Inconel; Stainless Steel. E. G. Canada. *Industry and Welding*, v. 21, June 1948, p. 40-43, 62.

Some interesting welding problems in connection with piping installations in a modern drug-manufacturing plant. Oxy-acetylene, arc, and inert-gas shielded-arc welding combine to handle a variety of piping in diameters ranging from ½ in. to 18 in.

22a-135. Fatigue Tests of Spot Welds: Improvement of Their Endurance Limit by Hydrostatic Pressure. Georges Welter. *Welding Journal*, v. 27, June 1948, p. 285s-298s.

Spot welded Alclad 24 ST Al-alloy specimens, stainless steel and mild-steel specimens were investigated with regard to metallographic and mechanical properties in the "as-received" condition as well as after special treatment under high hydrostatic pressure. Tests revealed that an appreciable increase of endurance limit is achieved by use of high hydrostatic pressure up to 230,000 psi. At 10,000,000 cycles, an improvement of 250 to 300% of the fatigue resistance of 24 ST alloy specimens seems quite possible.

22a-136. Trade Names of Electrodes and Comparable A.W.S.-A.S.T.M. Designations. *Welding Engineer*, v. 33, June 1948, p. 67.

22a-137. Brazing and Other Applications of High-Frequency Heating. H. Bunte. *Welding Journal*, v. 27, June 1948, p. 441-444.

Fundamentals and various available types of apparatus. Methods of work handling.

22a-138. A Survey of Established Processes for the Jointing of Metals. D. F. Hewitt. *Sheet Metal Industries*, v. 25, June 1948, p. 1205-1212.

Atomic-hydrogen welding, electrical fusion welding, Weibel process, thermit process, spot, stitch, projection, seam, butt, and flash welding. (To be continued.)

22a-139. Decreased Purity of Oxygen Results in Loss of Efficiency. (In Russian.) A. D. Akimenko and Kh. I. Evdokimchik. *Promyshlennaya Energetika* (Industrial Power), v. 5, Feb. 1948, p. 12-13.

A comparative study of the use of 99 and 98% oxygen, respectively, in welding, showed that the former is more advantageous, both on a technical and on an economic basis.

22a-140. Powder Weld. Powder Weld Co., (Brooklyn, N. Y.) 1947, 21 pages.

New method of welding, brazing, or surfacing using widely varying compositions of powdered materials.

22a-141. Automatic Welding Speeds Pipe Line Work. G. L. Revell and C. G. Herbruck. *Petroleum Engineer*, v. 19, June 1948, p. 78, 80.

Use of fixtures designed to use with "Lincolnweld" equipment and the hidden-arc, automatic, deep-flux welding.

22a-142. Welding Research. Comfort A. Adams and William Spraragen. *Metal Progress*, v. 53, June 1948, p. 811-816.

Work of the Welding Research Council of the American Welding Society, outlining progress made, present projects, and future plans.

22a-143. Some Considerations in Hard Surfacing. David B. Rankin. *Iron Age*, v. 161, June 17, 1948, p. 91-93.

Economic and technological considerations.

22a-144. Steel Fabricator Shifts to A.C. Welding. Frank Wendel. *Iron Age*, v. 161, June 24, 1948, p. 88-89.

Considerable savings were obtained by elimination of arc blow, lower power and maintenance costs, and ability to use larger electrodes.

22a-145. Fundamental Factors Influencing the Weldability of A.W.S. Type E 6020 Arc Welding Electrodes. Boyd E. Cass. *Foote Prints*, v. 20, no. 1, p. 14-21.

A test method and test results in an investigation to obtain data confirming the contention that the oxygen content of an E 6020-type electrode coating is a primary factor influencing operational and weld-deposit characteristics, to show that the amount of manganese in the coating plays a very important part in determining electrode characteristics, and to show that oxygen content and amount of manganese in the coating are interdependent functions that must be correlated to yield satisfactory coating formulations.

22a-146. Better Silver Brazing Methods Improve Refrigeration Equipment. A. W. Swift. *Refrigerating Engineering*, v. 55, June 1948, p. 556-559.

Recommended methods.

22a-147. A Chronicle of Arc Welding. Gilbert S. Schaller. *Western Metals*, v. 6, June, 1948, p. 32-35.

History and present day problems.

22a-148. About Torch Flames. *Victor Weld*, v. 4, June 1948, p. 10-13.

Their chemistry; their temperatures; and their usefulness in the welding industry.

22a-149. Causes and Remedies for Common Troubles With Spotwelding Machines. *Factory Management and Maintenance,* v. 106, July 1948, p. 134, 136.

22a-150. For More Efficient Production Check Your Maintenance Welding. Frank J. Gaydos. *Industry and Welding,* v. 21, July 1948, p. 26-30, 76-77.

Intelligent planning of work, preventive-maintenance practices, hard surfacing applications, and plate-fabrication procedures.

22a-151. Welding Dissimilar Metals With Stainless Electrodes. Anton L. Schaeffler. *Iron Age,* v. 162, July 1, 1948, p. 72-79.

A graphical method that makes possible the prediction of weld-metal composition and structure; the joining of dissimilar metals utilizing single deposits and multipass welds.

22a-152. Bonding Aluminum to Ferrous Metals. M. G. Whitfield and V. Sheshunoff. *Iron Age,* v. 162, July 1, 1948, p. 88-93.

Processing techniques and design factors involved in accomplishing the above by casting operations. A method of assembly in which aluminum sheet is brazed to steel or cast-iron parts. Typical applications.

22a-153. Functionalized Electronic Controls for Resistance Welding. W. E. Large. *Iron Age,* v. 162, July 8, 1948, p. 90-94.

Use of eight main and six supplementary assemblies which will allow numerous combinations for sequencing and weld timing.

22a-154. Cold Welding; Technique and Application. *Welding,* v. 16, June 1948, p. 260-262, 267.

New process of welding without heat. Surface preparation, suitable materials, weld strength, and welding methods.

22a-155. Resistance Welding in Mass Production; Control Equipment for Resistance Welders. A. J. Hipperson and T. Watson. *Welding,* v. 16, June 1948, p. 263-267. (To be continued.)

22a-156. Research Progress; a Critical Survey. *Welding,* v. 16, June 1948, p. 269-271.

Reviews eight recent papers on various topics related to welding.

22a-157. Welding and Low-Temperature Brazing of Air Conditioning and Refrigeration Parts. Ward Swarthout. *Welding Journal,* v. 27, July 1948, p. 511-516.

Typical products which can be fabricated satisfactorily by the oxy-acetylene method. Techniques used in making heat pumps and other air-conditioning and refrigeration equipment.

22a-158. Overheating of Electrodes. I. L. Stern. *Welding Journal,* v. 27, July 1948, p. 522-526.

Method for investigating the tendency of electrodes to overheat during operation. Several bad effects which may result from overheating. Application of the method to a specific problem.

22a-159. Manual Use of Hidden-Arc Welding Reduces Welding Time on U68 Code Work by 42%. Emmett A. Smith. *Welding Journal,* v. 27, July 1948, p. 536-538.

Application of the above as a production tool in manufacture of refinery equipment.

22a-160. Penetration and Travel Speed in Metal-Arc Welding. R. Gunnert. *Welding Journal,* v. 27, July 1948, p. 542.

Results of tests to determine validity of penetration formulas developed for Unionmelt welding.

22a-161. Technical Progress Report of the Ship Structure Committee. *Welding Journal,* v. 27, July 1948, p. 377s-384s.

A sequel to the Final Report of the Ship Structure Committee's predecessor, "The Board to Investigate the Design and Methods of Construction of Welded Steel Merchant Vessels." Summarizes findings on design, material, methods of fabrication, and structural failures of steel merchant vessels. 53 ref.

22a-162. Plastic Bonding for Composite Wood and Metal Structures. Charles J. Moss. *Plastics* (London), v. 12, June 1948, p. 304-311.

With the development of the Redux process, rational wood and metal structures became possible for the first time. Various examples of Redux bonding.

22a-163. Nomenclature and Applications of Welding Electrodes. F. W. Myers. *Tool Engineer,* v. 21, July 1948, p. 29-33.

Selection of welding rods for various applications.

22a-164. Welding Dissimilar Metals: Basic Principles of This Important Production Technique Are Outlined. D. R. Kasanof. *Petroleum Refiner,* v. 27, July 1948, p. 135.

22a-165. A.C.F.'s Welded Hopper-Car Assembly Line. *Railway Age,* v. 125, July 17, 1948, p. 32-33.

Application of various welding techniques to the construction of 70-ton hopper cars by American Car & Foundry Co., Huntington, W. Va.

22a-166. Novel Developments in Design and Operation of A.C. Arc-Welding Plant. E. C. Davies. *Transactions of the Institute of Welding,* v. 11, June 1948, p. 92-96.

Some recent developments and a few investigations in the experimental stage.

22a-167. Argonarc Welding: Review of Progress. R. R. Sillifant. *Transactions of the Institute of Welding,* v. 11, June 1948, p. 114-118.

Previously abstracted from *Welding,* v. 16, Feb. 1948, p. 53-60. See item 22a-81, 1948.

22a-168. Flash Butt Welding. Part III. S. G. E. Nash, H. Brooks, and M. A. Garnett. *Aircraft Production,* v. 10, July 1948, p. 243-247.

Post-welding tests and results; future prospects.

22a-169. How Metal Parts Are Joined in Electric Brazing Furnaces. R. E. Jones. *Western Metals,* v. 6, July 1948, p. 28-29.

Joining of miscellaneous metal parts by electric-furnace copper brazing of steel and by localized silver brazing.

22a-170. Influence of Welding on Marine Engine Design. J. A. Dorrat. *Welding,* v. 16, July 1948, p. 276-283.

Present trends in application of welded design to modern engine structures. Electrodes, choice of materials, joint arrangement as well as salient features and advantages of fabricated construction.

22a-171. Keeping the Mills Rolling. Frank J. Gaydos. *Welding Engineer,* v. 33, Aug. 1948, p. 35-38.

Hard facing and buildup practices as important phases of welding maintenance in a steel mill.

22a-172. Bits for New Oil Wells. Gerald Eldridge Stedman. *Welding Engineer,* v. 33, Aug. 1948, p. 40-42.

Applications of welding procedures in fabrication of deep-well rock bits.

22a-173. Gar Wood Adapts Automatic Welding. Clyde B. Clason. *Welding Engineer,* v. 33, Aug. 1948, p. 46-49, 60.

Use in multiple-duty fabrication with three submerged-melt welding fixtures to speed production of components for road-building equipment.

22a-174. How to Choose and Use the Correct Electrode Properties, Diameter, Polarity, Current, Voltage Electrode Angle, Penetration, Travel Speed. Lew Gilbert. *Industry and Welding,* v. 21, Aug. 1948, p. 30-32, 34, 37.

First of three installments.

22a-175. Welded Studs Cut Costs and Speed Work on Corrugated Metal Roofing Job. Robert C. Friedly. *Engineering News-Record,* v. 141, Aug. 5, 1948, p. 88-89.

Methods of applying corrugated sheet-metal roofing and siding to large building construction, involving the use of a special welding gun, which endwelds rivets to the steel purlins. The corrugated metal then is impaled over the rivets, which are upset and rounded off to form a weather-tight job.

22a-176. Questions fondamentales en matiere de constructions soudées. (Fundamental Questions Concerning Welded Structures.) F. Campus. *Schweizer Archiv,* v. 14, May 1948, p. 129-137.

Symposium of the conference which took place February 1947 in Geneva covering all phases of mechanical testing of welded structures.

22a-177. Bibliography on Power Supply for Electric Welding, 1940-1947. *American Institute of Electrical Engineers,* June 1948, 10 pages.

Contains 71 references prepared by the A.I.E.E. Technical Committee on Electric Welding.

22a-178. Welding and Low-Temperature Brazing of Air Conditioning and Refrigeration Parts. Ward Swarthout. *Steel Processing,* v. 34, Aug. 1948, p. 416-419.

Oxy-acetylene applications and design requirements.

22a-179. Dissimilar Metals Joined by Step Brazing Methods. I. S. Goodman. *Materials & Methods,* v. 28, Aug. 1948, p. 64-67.

Technique used in assembly of electronic radar tubes.

22a-180. Contact Fillet Welding at High Speeds. (In Russian.) G. V. Nedzvetskii. *Avtogennoe Delo.* (Welding), April 1948, p. 10-12.

New type of machine for the above. Optimum welding conditions for low-carbon steel and brass sheet.

22a-181. Heating and Cooling Curves of Metals During Welding. (In Russian.) L. A. Fridlyand. *Avtogennoe Delo.* (Welding), April 1948, p. 12-16.

Attempts to establish a theoretical relation between the rate of preheating of the weld and its cooling rate. Obtained theoretical data are confirmed by experimental investigation.

22a-182. Brazing, Soldering and Oxy-Acetylene Processes. Robert W. Bennett. *Metals Review,* v. 21, Aug. 1948, p. 3, 5, 7.

Reviews 1947 literature. References to "A.S.M. Review of Current Metal Literature".

22a-183. Welding Supplies and Equipment. *Metals Review,* v. 21, Aug. 1948, p. 9, 11, 13, 15, 17.

New products and techniques developed during the past six months as described by the manufacturers.

22-184. Metallurgical Books. Sibyl E. Warren. *Metals Review,* v. 21, Aug. 1948, p. 41, 43, 45, 47.

Books published during 1936-1946 on welding and cutting, working processes, machining, and surface treatment.

22a-185. Resistance Welding in Mass Production; Control Equipment for Resistance Welders. A. J. Hipperson and T. Watson. *Welding,* v. 16, Aug. 1948, p. 350-354.

Characteristics of different types of resistance-welding control devices and their methods of operation.

22a-186. Electrical Characteristics of the Arc in "Heliarc" Welding. H. T. Herbst. *Welding Journal,* v. 27, Aug. 1948, p. 600-604.

Heliarc welding is different from other methods of arc welding in that the arc is drawn between the workpiece and a virtually nonconsumable tungsten electrode while the electrode, the arc and the weld metal are protected by a sheath of inert gas. The use of an inert gas as a shielding medium makes it unnecessary to use flux when welding most of the common metals.

22a-187. Development of Arc Welded Propeller Hubs. Clarence C. Mast, Paul F. Hackethal and Douglas W. Hamilton. *Welding Journal,* v. 27, Aug. 1948, p. 605-609.

Design and welding steps used.

22a-188. Modern Projection Welding. Robert A. Reich. *Welding Journal,* v. 27, Aug. 1948, p. 610-612.

A method of resistance welding whereby the current flow and heating during the welding operation are localized at predetermined points called projections or embossments.

22a-189. Contact Electrodes and Applications of Contact Arc Welding. P. C. van der Willigen and G. Zoethout. *Welding Journal,* v. 27, Aug. 1948, p. 615-620.

The special characteristics of contact-arc welding are shown as applied to vertical and horizontal welding. Advantages are set forth and a new application, "contact-arc spot welding", is discussed.

22a-190. The Weldability of Alloys for High-Temperature Service. George E. Linnert. *Welding Journal,* v. 27, Aug. 1948, p. 385s-405s.

A new laboratory test specimen which incorporates the design features found in the weld joint of a bucketed gas turbine wheel is employed. Virtually all of the crack-type defects reported to occur in welded bona-fide turbine wheels are reproduced in this "wheel and bucket" test specimen, the most important kind of cracking being a form of notch extension which propagates from the junctions between the buckets and travels transversely across the weld deposit.

22a-191. Welding Arc Temperatures. W. R. Chynoweth, J. U. Jeffries, R. J. LaPante, R. J. Krieger and G. H. Fett. *Welding Journal,* v. 27, Aug. 1948, p. 426s-427s.

Determination of temperature of welding arc under assumed conditions of thermodynamic equilibrium. It is recognized that there is no such thing as equilibrium in the welding arc. Factors which govern arc temperature.

22a-192. Bronzewelding in Repair Work. T. J. Palmer. *Machinery* (London), v. 73, Aug. 5, 1948, p. 162.

Process and application.

22a-193. Rare and Purer. *Industrial and Engineering Chemistry,* v. 40, Sept. 1948, p. 10A, 12A, 16A.

Development of method for production of high-purity helium and its advantages for welding Al, Mg, Ti, Zr, and stainless and high alloy steels by the shielded-arc method.

22a-194. Resistance-Welding Equipment Considerations. C. E. Smith. *Electrical Engineering,* v. 67, Sept. 1948, p. 865. Based on "Resistance-Welding Machine and Power Supply", to be published in *A.I.E.E. Transactions,* v. 67, 1948.

Factors to be considered in selection of the equipment.

22a-195. Code Restrictions on Welding. Walter Samans. *Mechanical Engineering,* v. 70, Sept. 1948, p. 772-773.

The chairman of several committees on pressure-vessel codes defends the codes which J. F. Lincoln of Lincoln Electric Co. believes are "unfair" to welding and overly favorable to riveted construction.

22a-196. How to Choose and Use the Correct Electrode. Part II. Lew Gilbert. *Industry and Welding,* v. 21, Sept. 1948, p. 40-42, 46-47, 87-88.

Welding technique, importance of interpass cleaning and different types of weld defects—their causes and cures.

22a-197. Welding for Economy-Flexibility-Appearance. Power Shovels and

Cranes. Lou Hardnack. *Industry and Welding,* v. 21, Sept. 1948, p. 50, 52, 54.
Thew Shovel Co. has gradually redesigned component parts and thus far converted 70 per cent to weldments.

22a-198. Precision Soldering of Small Parts. *Iron Age,* v. 162, Sept. 9, 1948, p. 77.
Process for soldering magnetic pole pieces to a tiny diaphragm disk 0.0038 in. thick in the earpiece of a hearing aid.

22a-199. Production Gas Joining Air Conditioning and Refrigeration Parts. Ward Swarthout. *Steel,* v. 123, Sept. 13, 1948, p. 116, 119, 148.
Closure, jointing, mounting, and other major operations are efficiently accomplished by oxy-acetylene welding and low-temperature brazing.

22a-200. Standardization of Gas Welding Using Acetylene-Oxygen Flames. (In Russian.) I. S. Smirnov. *Avtogennoe Delo* (Welding), May 1948, p. 28-31.
For cast iron, steel, copper, and brass.

22a-201. Standardized Guns Cut Welding Costs. Rex Heath. *Tool Engineer,* v. 21, Sept. 1948, p. 36.
A series of these welding guns developed by Progressive Welder Co., Detroit.

22a-202. Choosing the Correct Metals-Joining Method. Joseph W. Kehoe. *Machinery,* v. 55, Sept. 1948, p. 185-188.
Factors involved in choosing a method that will fulfill requirements.

22a-203. New Electronic R-W Controls. Part I. Fundamental Timers and Non-Synchronous Controls for Resistance Welding. B. Sussman. *Welding Engineer,* v. 33, Sept. 1948, p. 44-48.
Circuit diagrams for the above.

22a-204. Applications, Materials, and Specifications of Bolts. W. C. Stewart. *SAE Quarterly Transactions,* v. 2, July 1948, p. 412-418.
Previously abstracted from condensed version in *SAE Journal,* v. 56, April 1948, p. 20-22. See item 22a-113, 1948.

22a-205. The Ultrasonic Testing of Welds. G. A. Homes. *Engineers' Digest* (American Edition) v. 5, Aug. 1948, p. 284. From *Arcos Review,* July 1947, p. 2539-2552.
British and American practice involves use of cathode-ray tubes. The Belgian method, which is outlined, is based on a combination of the measurement of intensity of the ultrasound after passage through the test piece and its measurement on reflection from a defect.

22a-206. Resistance-Welding Characteristics of the Dry Disk Rectifier Welder. C. E. Smith and R. H. Blair. *Welding Journal,* v. 27, Sept. 1948, p. 679-686.
A general discussion on the electrical operation and electrical characteristics. Advantages and disadvantages of the secondary wave shape and the self-regulating effect in spot, seam, projection, and push-butt welding of aluminum, low-carbon steel, stainless steel, and other alloys.

22a-207. Stand Holds Three Welding Fixtures. C. W. Holmstrom. *American Machinist,* v. 92, Sept. 23, 1948, p. 128.
Stand designed for rotary movement in two planes which simplifies welding operations and reduces welding time.

22a-208. Hard Surfacing With High Frequency Currents. E. M. Kouzmak and A. I. Kourdin. *Engineers' Digest* (American Edition), v. 5, Aug. 1948, p. 279-280. Translated and condensed from *Avtogennoe Delo* (Welding), No. 3, 1947, p. 1-4.
Results of a study of the efficiency of high-frequency heating coils of various shapes and size; and of physical and chemical properties of the layer deposited.

22a-209. A White-Hot Piggy Bank. S. Dan Brodie. *Western Machinery and Steel World,* v. 39, Sept. 1948, p. 102-104.
Technical and cost advantages of furnace brazing over welding as shown by experience where nearly 10,000 different parts and assemblies are made for use on positive displacement liquid meters and accessories.

22a-210. Arc Phenomena With Electrodes Moving at High Speed. W. B. Kouwenhoven and T. Benjamin Jones. *Welding Journal,* v. 27, Sept. 1948, p. 470s-475s.
The arc system used consisted of a fixed electrode (cathode) in the form of a vertical rod and a moving electrode (anode) in the form of a 1 x 0.35-in. steel tape. Studies of arc phenomena were made by moving the anode tape at speeds in the range of 20 to 400 ft. per min. The formation of discrete anode spots was observed.

22a-211. Automatic Regulation in Welding Technology. (In Russian.) K. K. Khrenov. *Avtogennoe Delo* (Welding), June 1948, p. 1-10.
From the theoretical point of view. Factors to be considered. Sev-

eral electrical circuits used in the U.S.S.R. are presented.

22a-212. New Equipment and Apparatus for Gas Welding and Cutting of Metals. (In Russian.) V. S. Chernyak and Yu. Ya. Shafit. *Avtogennoe Delo* (Welding), June 1948, p. 25-29.

Together with methods of use.

22a-213. Development of Arc Welding in Russia. (In Russian.) V. P. Nikitin. *Avtogennoe Delo* (Welding), July 1948, p. 1-8.

An historical review covering the period 1802 to date. 85 ref.

22a-214. Automatic Regulation in Welding Technology. III. Automatic Arc Welding. (In Russian.) K. K. Khrenov. *Avtogennoe Delo* (Welding), July 1948, p. 9-15.

Different types, including their theoretical bases.

22a-215. Heating of Metals With the Oxy-Acetylene Flame. (In Russian.) N. N. Rykalin and M. Kh. Shorshorov. *Avtogennoe Delo* (Welding), July 1948, p. 16-21.

Temperature gradients were determined. Equations for calculation of temperature distributions in the metal around a moving source of heat are derived.

22a-216. Hard Facing. L. Sanderson. *Machinery Lloyd* (Overseas Edition), v. 20, Sept. 11, 1948, p. 75-79.

Materials are alloy steels; ferrous alloys; nonferrous alloys; solid tungsten carbides; and powdered tungsten carbide. Methods include oxy-acetylene, metallic-arc, and atomic-hydrogen welding.

22a-217. '48 . . . A Year of Significant Technological Advances in Welding. *Industry and Welding,* v. 21, Oct. 1948, p. 28-34, 71-75.

Advances in arc welding; oxy-acetylene welding, brazing, and cutting; inert-gas-shielded arc welding; and resistance welding.

22a-218. Are Your Welding Costs Too High? J. R. Stitt. *Industry and Welding,* v. 21, Oct. 1948, p. 38-39, 42-43, 76-77.

A.W.S. symbols, templets, automatic flame cutting, grouping of parts and fitting up. First of two installments.

22a-219. Jigs Help Make Welding Easy. *Linde Tips,* v. 27, Oct. 1948, p. 77-79.

A number of simple work-holding devices.

22a-220. Hints for Free-Hand Circle-Cutting. *Linde Tips,* v. 27, Oct. 1948, p. 86.

22a-221. It's Easy to Control Weld Metal. *Linde Tips,* v. 27, Oct. 1948, p. 92-93.

How to use carbon, in the form of paste, plate, and rod to save time and work in preparing a job for welding and to eliminate need for final grinding, chipping, or machining on some jobs.

22a-222. New Outlook in Brazing. *Fortune,* v. 38, Oct. 1948, p. 127-130, 132.

Miscellaneous applications of brazing, and ancient metal-joining technique, rediscovered during the war, which offers some startling production short cuts.

22a-223. New Electronic R-W Controls. Part Two. Synchronous Precision Timing Circuits and Their Controls for Resistance Welding. B. Sussman. *Welding Engineer,* v. 33, Oct. 1948, p. 74-76, 78.

Description and diagrams.

22a-224. Fluxes for Inert-Arc Welding. Russell Meredith. *Welding Engineer,* v. 33, Oct. 1948, p. 51-53.

Unless the work can be properly jigged, it is more satisfactory to use a flux than an inert-gas back-up for thin-gage flange and fillet joints. Selection of fluxes.

22a-225. High Speed Induction Brazing with Interchangeable Fixtures. A. E. Heidenreich and John W. Stead, Jr. *Iron Age,* v. 162, Oct. 7, 1948, p. 95-97.

Versatility of a radio-frequency induction generator, used in brazing parts for adding machines, has been greatly increased by the development of four interchangeable fixtures. These fixtures are used to braze and anneal 15 different parts.

22a-226. The British Welding Research Association. F. A. Fox. *Metallurgia,* v. 38, Sept. 1948, p. 276-279.

Some of the problems being investigated by this association are outlined in this review of the year's work.

22a-227. A New Adhesive for Metals. C. J. Moss. *Aeroplane,* v. 75, Sept. 24, 1948, p. 423-425.

Previously abstracted from *Plastics* (London), v. 12, June 1948, p. 304-311. See item 22a-162, 1948.

22a-228. Quick Joints Without Welding. *Inco Magazine,* v. 22, Fall 1948, p. 19.

New machine and process developed to make joints in light-wall tubing up to 12-in. in diameter.

22a-229. The Function of the Coating of Welding Rods. J. D. Fast. *Philips Technical Review,* v. 10, Oct. 1948, p. 114-122.

Requirements that have to be met by welding-rod coatings. Protection afforded by the slag against oxygen and nitrogen. The most important types manufactured by Philips.

22a-230. Resistance Welding in Mass Production; Recommended Machine Settings. A. J. Hipperson and T. Watson. *Welding,* v. 16, Oct. 1948, p. 436-445.

Means of measuring electrical variables, recommended settings for spot seam, projection, and flash welding of mild steel, stainless steel, and aluminum.

22a-231. Sampling of Welds by Trepanning and Allied Methods. R. B. Lincoln. *Welding Journal,* v. 27, Oct. 1948, p. 809-811.

Recommended procedures.

22a-232. An Investigation of Methods for Evaluating Welding-Arc Stability and Their Application. Robert A. Wyant, Lauriston P. Winsor, and L. McDonald Schetky. *Welding Journal,* v. 27, Oct. 1948, p. 502s-514s.

Development of instrumentation for quantitatively evaluating above stability and application of such instrumentation to study of some actual welding arcs. Instrumentation has taken the form of circuits for determining r.m.s. values of the fluctuating components of arc current and voltage and for counting short circuits.

22a-233. New Welding Electrode Specifications. Thomas E. Lloyd. *Iron Age,* v. 162, Oct. 28, 1948, p. 70-73, 131.

New sets of A.W.S.-A.S.T.M. specifications for copper and Cu alloys and for high-tensile low-alloy steel arc welding electrodes, and revisions of specifications for corrosion-resisting and for mild-steel arc welding electrodes.

22a-234. Contribution aux progres de la construction soudée dans l'industrie aéronautique. (New Developments in Welded Construction in the Aircraft Industry.) A. Nepoti. *Soudure et Techniques connexes,* v. 2, July-Aug. 1948, p. 140-152.

A series of examples from the European aircraft industry. Compares riveted duralumin structures and welded steel structures and recommends the latter.

22a-235. New Electronic R-W Controls. Part Three. Control Features and Sequence Timers for Synchronous Precision Timing. (Concluded.) B. Sussman. *Welding Engineer,* v. 33, Nov. 1948, p. 56-58.

Circuit diagrams.

22a-236. How to Choose and Use the Correct Electrode. Part III. Lew Gilbert. *Industry and Welding,* v. 21, Nov. 1948, p. 36-38, 40, 42.

Concluding installment contains information on electrode classification and identification. Stainless-steel procedures, preheating, and stress relieving.

22a-237. Safety Is so Simple. J. I. Banash. *Industry and Welding,* v. 21, Nov. 1948, p. 44-46, 48, 51-52.

Safety precautions for oxy-acetylene welding and cutting.

22a-238. Here Are Some Helpful Hints On Resistance Welder Maintenance. F. R. Woodward. *Industry and Welding,* v. 21, Nov. 1948, p. 64, 66-69.

22a-239. How to Care for Transformer Type A.C. Arc Welders. J. R. Morrill. *Factory Management and Maintenance,* v. 106, Nov. 1948, p. 120-123.

Maintenance procedures. Causes and remedies for troubles.

22a-240. How to Use Helium-Shielded Arc Welding. Harold O. Jones. *American Machinist,* v. 92, Nov. 4, 1948, p. 101-116.

Special section on the subject.

22a-241. Design Characteristics of Contact Welding Machines. (In Russian.) A. Z. Blitshtein. *Avtogennoe Delo* (Welding), Aug. 1948, p. 1-6.

A graphic method for determination of design characteristics. Experimental investigation confirms the applicability of this method to the determiniation of welding-machine characteristics prior to their operation. Use of the diagram.

22a-242. Inert Gas Welding: The Aircomatic Process. J. S. Sohn and A. N. Kugler. *Western Metals,* v. 6, Nov. 1948, p. 28-30. A condensation.

Process, uses an automatic "gun".

22a-243. Trends in Resistance Welding Here and Abroad. F. R. Hensel and E. F. Holt. *Welding Journal,* v. 27, Nov. 1948, p. 903-912.

22a-244. The Gas Shielded Metal Arc-Welding Process. Jesse S. Sohn and A. N. Kugler. *Welding Journal,* v. 27, Nov. 1948, p. 913-915.

New development.

22a-245. The Stability of Oxyacetylene Flames. Lewis D. Conta. *Welding Journal,* v. 27, Nov. 1948, p. 921-928.

The combustion of oxy-acetylene mixtures, covering such topics as normal flame propagation, flame velocities, detonation waves, and flame characteristics; followed by discussion of stability and control of backfire and flashback.

22a-246. New Joining Process Brings Automatic Welding to Hand Tool. *Steel,* v. 123, Nov. 29, 1948, p. 86.

Welding device and system used in Aircomatic, gas-shielded, metal-arc method.

22a-247. 48,000 Welds an Hour. *Iron Age,* v. 162, Dec. 2, 1948, p. 113.

Three-station, multipoint spot welder automatically inserts, positions, and welds to an elliptically-shaped muffler body, a baffle assembly consisting of six different components.

22a-248. Flame Hardening—Principles, Applications, and Equipment. M. S. Rosengren. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 718-726. Reprinted from *Welding Journal,* v. 27, June 1948, p. 453-455.

22a-249. The Russian School of Thought in the Development of Electric Arc Welding. (In Russian.) V. I. Nikitin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 809-821.

83 references.

22a-250. Report From Paris; Congres International des Fabrications Mecaniques. *Welding,* v. 16, Nov. 1948, p. 481-484.

One section of this congress was devoted to the application of welding in machine construction and the development of welding processes. Summarizes outstanding features and welding papers given.

22a-251. Resistance Welding in Mass Production; Resistance Welding Costs. A. J. Hipperson and T. Watson. *Welding,* v. 16, Nov. 1948, p. 486-491.

Economic factors. Average figures for different classes of work.

22a-252. British Welding Prospects. J. H. Paterson. *Chemical Age,* v. 59, Nov. 6, 1948, p. 625-626.

Effects of new technology and cost factors.

22a-253. Inert-Arc Welding of Hard-to-Weld Metals. M. J. Conway. *Machinery,* v. 55, Dec. 1948, p. 148-154.

Amount and kind of inert gas, type of polarity and current, and welding circuits best suited for joining such hard-to-weld metals as stainless steel, aluminum, and magnesium.

22a-254. Jigging for Better Welds. Phil Glanzer. *Welding Engineer,* v. 33, Dec. 1948, p. 44-48.

Principles of welding-jig design.

22a-255. Inert-Arc Welding (Using A.C. High-Frequency Equipment). *Welding Engineer,* v. 33, Dec. 1948, p. 67.

Recommended procedures for aluminum, magnesium (M-1 alloy), and stainless steel.

22a-256. Factors Involved in Design of Welded Sheet Metal Joints for Production Assembly. Robert E. Allen. *Automotive Industries,* v. 99, Dec. 1, 1948, p. 46-47. A condensation.

Illustrates factors by description of some examples in automotive body design.

22a-257. Are Your Welding Costs Too High? Part II. J. R. Stitt. *Industry and Welding,* v. 21, Dec. 1948, p. 26-30, 63-64, 78-79.

Factors which largely determine the quality of welding and the cost of the finished weldment.

22a-258. Here's Something New in Spot Welding. F. J. Pilia. *Industry and Welding,* v. 21, Dec. 1948, p. 32, 34, 36, 38.

Inert-gas shielded-arc spot welding. The weld is produced by heat from an electric arc applied to the top surface of two lapped pieces. Welding action is controlled by current input and time.

22a-259. Production Processes—Their Influence On Design. Part XXXIX. Seam Welding. Roger W. Bolz. *Machine Design,* v. 20, Dec. 1948, p. 115-121.

Design for seam welding, the process itself, and its applications.

22a-260. Metal Joining With Paste Type Fusion Alloys. D. C. Dilley. *Machine Design,* v. 20, Dec. 1948, p. 146-148.

Paste alloys, known as Micro-Film alloys, which can be used for joining parts of aluminum, stainless steels, carbon and alloy steels, coppers, silver, brasses, tin, die-cast alloys, and carbides. Typical methods of application.

22a-261. New Joining Process Makes Possible "One Side" Spot Welds. F. J. Pilia. *Steel,* v. 123, Dec. 13, 1948, p. 84-86, 118, 121-122.

Previously abstracted from *Industry and Welding,* v. 21, Dec. 1948, p. 32, 34, 36, 38. See item 22a-258, 1948.

22a-262. Developments in Metal Stitching. A. E. Rylander. *Tool Engineer,* v. 21, Dec. 1948, p. 32-33.

Typical applications. With special machines, the method may be applied to assembly of metallic components made up of steel, aluminum, wood, leather, rubber, plastics, and other materials as well as their combinations.

22a-263. Welding Fixtures for Arc-Welded Equipment. Harold H. Hicks. *Welding Journal,* v. 27, Dec. 1948, p. 1024-1028.

Methods and procedures for the mass production of welded equipment and essential factors in creating fixtures.

22a-264. Welding Research Problems. *Welding Journal,* v. 27, Dec. 1948, p. 569s-576s.

Fundamental and practical problems on which research is believed desirable by the Welding Research Council are outlined under the general headings of: general physics and electricity; chemistry and physical chemistry; metallurgy; mechanical and testing; and structural studies.

22a-265. Electrodes and Metals. A. S. Tuttle. *Canadian Metals & Metallurgical Industries,* v. 11, Dec. 1948, p. 25, 29-31.

Importance of electrodes in arc welding—their development, standardization, and nomenclature.

22b—Ferrous

22b-1. Railway Wagon Production at the Derby Works of the L.M.S.R. *Welding,* v. 15, Nov. 1947, p. 512-515.

Welding jigs and procedures.

22b-2. Excavating Machinery; Use of Fabricated Units. T. W. Broughton. *Welding,* v. 15, Nov. 1947, p. 516-519.

Fabrication procedures, which include welding.

22b-3. Shape Welding by Submerged Melt Process. J. A. Kratz. *Welding Engineer,* v. 33, Jan. 1948, p. 36-39.

How continuous machine welds can be made to follow prescribed outlines by mounting a submerged-melt head on the templet-guided carriage of an ordinary shape cutting machine.

22b-4. Stud Welding in Great Britain. A. H. Bent. *Welding Engineer,* v. 33, Jan. 1948, p. 40-42.

British equipment for arc welding steel studs to steel plates resembles stud welding guns used in the U. S.

22b-5. Weight Saved: 20%. *Welding Engineer,* v. 33, Jan. 1948, p. 43.

How weld fabrication of a saddle for the lifting frame of a pallet-type lift truck saves weight and cuts machining costs.

22b-6. Hard Facing Brings Longer Life to Cane Cutters. *Welding Engineer,* v. 33, Jan. 1948, p. 52-53.

Application to machinery for cutting sugar cane.

22b-7. Prefabricated Ship Assembly. Margaret Ralston. *Welding Engineer,* v. 33, Jan. 1948, p. 60, 62.

How a Seattle shipbuilder built a 70-ft. fishing vessel in three parts and welded them together on the ways.

22b-8. Weld Repair of Gray Iron Castings. *Foundry Trade Journal,* v. 83, Dec. 11, 1947, p. 306, 308.

Based on article in *Iron Age.*

22b-9. Fabricated Oil Engine Structures; the Redesign of the Two-Stroke Type. C. B. M. Dale. *Welding,* v. 15, Dec. 1947, p. 555-558.

Welded redesign of the Petter Super-scavenge two-stroke oil-engine.

22b-10. Production Control; Factors Relating to Arc Welding. D. M. Kerr. *Welding,* v. 15, Dec. 1947, p. 559-567. Condensed from paper presented to the Institute of Welding.

Methods for control of arc welding in shipbuilding. Factors affecting production speeds, costs, rate fixing, influence of joint size and type, and also the preparation of work schedules.

22b-11. The Fuse-Bond Process; Principles and Applications. J. Porter. *Welding,* v. 15, Dec. 1947, p. 568-571.

A new, patented process similar to welding which has been adopted for the preparation of surfaces prior to the reclamation of worn parts by metal spraying. A special alloy is deposited on the surface to be sprayed, forming a preparation which results in a bond stronger than the sprayed metal itself.

22b-12. Oxygen Cutting; Sources of Gas Supply. E. Seymour Semper. *Welding,* v. 15, Dec. 1947, p. 573-579.

Concluding article of a comprehensive series dealing with various aspects of oxygen cutting.

22b-13. How to Cut Costs in Grinding and Finishing Welded Stainless Steel. H. H. Schultz and George Kopp. *Industry and Welding,* v. 21, Jan. 1948, p. 26-29, 52, 55.

Welding and grinding techniques used by Steel and Tube Products Co., Milwaukee.

22b-14. Welding Time Cut 75%. Axel Sundstrom. *Industry and Welding,* v. 21, Jan 1948, p. 51.

Use of automatic metallic arc welding in fabrication of residential and industrial heating boilers has reduced welding time to one-quarter of that required when manual welding was exclusively used.

22b-15. Some "Tips" on the Latest Use of Oxy-Acetylene Flame in Track Work. *Railway Engineering and Maintenance,* v. 44, Jan. 1948, p. 50-53.

Driver Burns, Corrugations and Hardening of Openhearth Frogs, by C. A. Daley; Hardening Rail Ends and Frogs, by R. W. Torbert.

22b-16. Welded Steel Locomotive Fireboxes. *Machinery* (London), v. 71, Dec. 11, 1947, p. 657-660.

Fabrication at the Brighton Works of the Southern Railway Co., England.

22b-17. Mechanized Welding of Cylindrical and Spherical Shells. *Machinery,* v. 54, Jan. 1948, p. 164-165.

Condensed from paper by H. T. Herbst before recent annual meeting of American Welding Society.

22b-18. Laying of Flat Bead Increases Production. *Steel,* v. 122, Jan. 19, 1948, p. 100.

Use of above welding method in the fabrication of cabinets for teletype printers.

22b-19. How Trailbuilder Units Were Designed for Arc Welding. G. J. Storatz. *Machine Design,* v. 20, Jan. 1948, p. 143-148, 185 Condensed from a James F. Lincoln Arc Welding Foundation prize-winning paper.

Design and fabrication of key units of a modern trailbuilder (bulldozer). Cost estimating for arc-welded structures

22b-20. Open-Butt Pressure Welding of Steel. H. R. Clauser. *Materials & Methods,* v. 27, Jan. 1948, p. 83-86.

New oxy-acetylene welding process which can be used on a variety of steel types, shapes, and forms.

22b-21. Want To Improve Your Hand-Cutting? *Linde Tips,* v. 27, Jan. 1948, p. 8-9.

Recommendations for proper technique.

22b-22. How to Make a Small Anvil. *Linde Tips,* v. 27, Jan. 1948, p. 9.

Made from scrap rail by flame cutting.

22b-23. New Life for the Old Car. *Linde Tips,* v. 27, Jan. 1948, p. 10-11.

Reclamation of worn and broken parts by welding.

22b-24. Bronze Welding Saves Time. *Linde Tips,* v. 27, Jan. 1948, p. 12.

Use of preheating in repairing a roller casting.

22b-25. To Salvage Worn Pistons. *Linde Tips,* v. 27, Jan. 1948, p. 15.

Rebuilding of worn surfaces with bronze and cast-iron rod.

22b-26. ABC's of Hard Facing. *Linde Tips,* v. 27, Jan. 1948, p. 16.

22b-27. Groove-Cutting—a Process for the Small Shop. *Linde Tips,* v. 27, Jan. 1948, p. 17-18.

Use of special nozzle in standard Prest-O-Weld or Purox cutting blowpipe to remove steel surface metal quickly without chipping or grinding.

22b-28. Induction Brazing Increases Output on Assembly Operation. *Production Engineering & Management,* v. 21, Jan. 1948, p. 54.

How processing time has been reduced to 7½ sec. per unit for a three-piece lawnmower rotor by use of induction heating with special ceramic fixtures.

22b-29. The Causes of Explosion of Some Welded Low Pressure Containers. Th. Wyss. *Engineers' Digest* (American Edition), v. 4, Dec. 1947, p. 568-570. Translated and condensed from *Zeitschrift fur Schweisstechnik,* v. 37, March 1947, p. 55-61; and June 1947, p. 127-130.

Five failures are illustrated and faulty design features are pointed out. Resulting standards of the Swiss Federal Institute for testing materials are outlined.

22b-30. Things Are Humming at Willow Run and Welding Does Its Share to Speed Production. *Weld,* v. 4, Jan. 1948,p. 5-7.

22b-31. Arc in the Barnyard. Robert West Howard. *Weld,* v. 4, Jan. 1948, p. 12-16. Reprinted from *Steelways.* See 23-252, R.M.L., v. 4, 1947 *(Metals Review,* Aug. 1947).

22b-32 Bum Welds—and What Makes Them. Frederick S. Dever. *Welding Engineer,* v. 33, Feb. 1948, p. 36-39, 43.

Various types of defects illustrated and analyzed. Deals mainly with stainless steel.

22b-33. Big Beam Break and Bend. LaMotte Grover. *Welding Engineer,* v. 33, Feb. 1948, p. 44-48.

Data for use in construction of welded bridges, ships, and buildings. Results of testing to failure of large welded box girders at various temperatures.

22b-34. Submerged-Melt Welding Makes Water Heater Tanks. *Welding Engineer,* v. 33, Feb. 1948, p. 52-55.

Joining of heads and bottoms to tank shells in one operation by a specially built submerged-melt welder, which turns out a completed tank in 1.01 min.

22b-35. A.W.S. Electrode Classifications. Part I—All-Position Types. *Welding Engineer,* v. 33, Feb. 1948, p. 67.

Data sheet covers E 6010, E 6011, and E 6012 types.

22b-36. Welding Stainless Steel Tanks Without Distortion or Buckling. *Steel,* v. 122, Feb. 2, 1948, p. 110.

Technique used by National Tank Mfg. Co., Los Angeles.

22b-37. New Welsh Steel Plant. *Welding,* v. 16, Jan. 1948, p. 3-6.

The buildings are of steel-framed construction and welding will be extensively used in their assembly.

22b-38. British Shipbuilding—4. The Cowes' Yards of J. Samuel White. J. A. Oates. *Welding,* v. 16. Jan. 1948, p. 7-14.

22b-39. Aeromatic Welding Procedures Lower Hub Costs. *Aviation Week,* v. 48, Feb. 2, 1948, p. 24-27. Based on "Development of Arc Welded Propeller Hubs", by Paul C. Hackathal, C. C. Mast, and D. W. Hamilton; prizewinner in James F. Lincoln Welding Foundation contest.

Arc welded tubular hubs reduced weight, fabrication time, and cost. The material previously used was Cr-Mo steel, forged and machined. Now, finished and annealed S.A.E. 4130 seamless steel tubing is the starting material.

22b-40. Rapid Manual Welding Using an Ultra-Short Arc and the Resulting Saving in Electrical Energy. (In Russian.) A. D. Bondarenko. *Promyshlennaya Energetika* (Industrial Power), v. 4, Oct. 1947, p. 1-5.

The essential difference between the method described and usual practice is a very thickly coated electrode used. This coating serves both as an insulator between the core of the electrode and the weld, and forms a shield between the end of the coating and the core on melting. Industrial application; comparison with other types of arc welding.

22b-41. Investigation of the Strength of Bronze Welded Joints. M. S. Fisher and H. Brooks. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 36.

Previously abstracted from *Transactions of the Institute of Welding,* v. 10, Oct. 1947, p. 149-160. See item 22-762, R.M.L., v. 4, 1947 *(Metals Review,* Jan. 1948.)

22b-42. Welding Techniques for Cast Iron. T. E. Kihlgren. *Welding Journal,* v. 27, Jan. 1948, p. 19-25.

Arc welding techniques using nonferrous electrodes of the Ni or Ni-Cu type. (Presented before A.W.S., New Jersey Section, at Newark, May 20, 1947.)

22b-43. High-Speed Oxy-Acetylene Tube Welding. H. O. Jones. *Welding Journal,* v. 27, Jan. 1948, p. 25-26.

Development of equipment for the above and experiments successfully carried out at a number of commercial installations by Air Reduction Co. (Presented at 28th Annual Meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22b-44. Let Contraction Do the Heavy Work. E. F. Kurzinski. *Welding Journal,* v. 27, Jan. 1948, p. 37-38.

Methods for correcting distortion during certain welding operations.

22b-45. Use of Carbide-Stabilizing Elements to Improve Weldability of Plate Steels. F. F. Franklin. *Welding Journal,* v. 27, Jan. 1948, p. 20s-26s.

Functions of carbide-stabilizing elements in the welding operation, and how they may be utilized to improve the welding properties of steels, particularly the low-alloy high-strength types.

22b-46. Hydrogen Embrittlement in Oxy-Acetylene Pressure Welding? K. B. Young and H. J. Nichols. *Welding Journal,* v. 27, Jan. 1948, p. 30s-32s.

Preliminary qualitative tests result from localized heating with a slightly reducing flame, followed by air cooling.

22b-47. Copper-Bar Semi-Automatic Welding. F. W. Myers. *Iron Age,* v. 161, Feb. 5, 1948, p. 70-74.

A German development called the Elin-Hafergut or copper-bar, arc welding technique and its merits and disadvantages.

22b-48. Shape Welding. *Mechanical Engineering,* v. 70, Feb. 1948, p. 153-156. Based on **Shape-Welding by the Submerged-Melt Welding Process,** by J. A. Kratz. (Presented at 28th Annual A.W.S. Meeting, Chicago, Oct. 1947.)

22b-49. Threadless Pipe Fittings. *Mechanical Engineering,* v. 70, Feb. 1948, p. 148-150.

Describes commercial products, their installation and application. They are made of black malleable iron and are used to join steel or wrought-iron pipe by brazing.

22b-50. "Custom Built" Installation Boosts Welded Tank Output. *Steel,* v. 122, Feb. 9, 1948, p. 104.

Continuous automatic welding setup.

22b-51. Effective Automatic Soldering. W. R. Graham. *Machinery* (London), v. 72, Jan. 15, 1948, p. 78-81.

Setup for soldering together the two halves of the case of a commercial-type oil filter.

22b-52. Automatic Welding Speeds up Box-Car Production. Charles O. Herb. *Machinery,* v. 54, Feb. 1948, p. 143-150.

Methods applied at Chicago Plant of American Car and Foundry Co.

22b-53. Radiographing and Controlled Low-Temperature Stress-Relieving of Welded Tanks for Wet Seal Gas Holder. Rudolf Kraus. *American Gas Journal,* v. 168, Feb. 1948, p. 11-16.

Previously abstracted from *Welding Journal.* See item 22-763, R.M.L., v. 4, 1947. (Presented at 28th annual meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22b-54. Arc Welding Broken Locomotive Frames. A. L. Havens. *Railway Mechanical Engineer,* v. 122, Feb. 1948 p. 82-83.

22b-55. Building up Locomotive Multiple Guides by Welding. *Railway Mechanical Engineer,* v. 122, Feb. 1948, p. 84.

22b-56. Carbon and Alloy Steels; Factors Governing Their Weldability. T. L. H. Butterfield. *Welding,* v. 16, Jan. 1948, p. 15-22.

An introductory short metallurgical survey of the nature of carbon and alloy steel.

22b-57. Pouvoir Trempant et Soudure des Aciers. (Hardenability and Welding of Steels). H. Granjon. *Revue de Métallurgie,* v. 44, May-June 1947, p. 187-192.

Changes in the structure of various types of steel during oxy-acetylene and arc welding were studied experimentally in order to determine effects of the hardenability on weld strength.

22b-58. Periodicity of the Process of Preliminary Crystallization in the Weld Crater During Welding Under Flux. (In Russian). B. I. Medovar and A. M. Makara. *Avtogennoe Delo* (Welding), Oct. 1947, p. 1-5.

The primary crystallization process is shown to have a periodic character. This causes formation of a laminated structure in the weld metal. The following facts were determined: thickness of the layers for a given seam is constant; periodicity of crystallization promotes agitation of the molten metal in the the weld crater; and the differences of chemical composition in the weld metal are very small.

22b-59. Welding of Bessemer and Thomas Steels. (In Russian). G. P. Mikhailov. *Avtogennoe Delo* (Welding), Oct. 1947, p. 9-11.

Results of an investigation made to determine optimum conditions.

22b-60. A Process for Determination of the Weldability of Steels. (In Russian). N. A. Sholotov. *Avtogennoe Delo* (Welding), Oct. 1947, p. 11-14.

Proposes four new qualitative methods, each of them particularly adapted to a different structural form to which welding is applied.

22b-61. Service Wear Resistance of Different Types of Welded Rail Joints. (In Russian). E. V. Sokolov. *Avtogennoe Delo* (Welding), Oct. 1947, p. 14-20.

Welded rail joints of the contact, thermit, and arc welded types were investigated both in the laboratory and in service. The results were in good agreement and indicated the superiority of contact welding. Test methods and data obtained.

22b-62. Automatic Flash Welding of "I.Zh. 350" Motorcycle Frames. (In Russian). G. R. Dobis. *Avtogennoe Delo* (Welding), Oct. 1947, p. 20-21.

The machine and the welding conditions used.

22b-63. Standardization of Oxygen-Cutting Procedures Using Gasoline, Kerosene, and Acetylene. (In Russian) I. S. Smirnov. *Avtogennoe Delo* (Welding), Oct. 1947, p. 23-28.

Standard times for cutting various sizes of different shapes are tabulated for the different fuels.

22b-64. Twelve and Thirteen-Ton Wagon Frames Fabricated by Arc Welding. *Welder,* v. 16, Oct.-Dec. 1947, p. 76-77.

"Wagons" are British freight cars.

22b-65. Welding on the Railways (Civil Engineering). W. K. Wallace. *Welder,* v. 16, Oct.-Dec. 1947, p. 78-81.

22b-66. Welding at the Doncaster Works of the L.N.E.R. *Welder,* v. 16, Oct.-Dec. 1947, p. 82-86.

Work at British railway shop.

22b-67. Prefabricated Experimental Unit Stations on the L.M.S. *Welder,* v. 16, Oct.-Dec. 1947, p. 87-88.

Welded construction at British railway stations.

22b-68. The Fabrication of Tank Locomotives by Arc Welding. *Welder,* v. 16, Oct.-Dec. 1947, p. 88-90.

22b-69. "Merchant Navy" Class Locomotives. *Welder,* v. 16, Oct.-Dec. 1947, p. 91-93.

Welding fabrication procedures.

22b-70. Some Applications of Electric-Arc Welding at Swindon. *Welder,* v. 16, Oct.-Dec. 1947, p. 94-95.

At locomotive shops of a British railway.

22b-71. Pouvoir Trempant et Soudabilité Métallurgique des Aciers. (Hardenability and Metallurgical Weldability of Steels.) H. Granjon. *Soudure et Techniques Connexes,* v. 1, Nov.-Dec. 1947, p. 230-242.

Defines weldability and hardenability and outlines properties important in weldability testing. Uses made of the hardenability study and how it contributes to knowledge of weldability of steels. 18 ref.

22b-72. Réparation d'un Pot de Presse Hydraulique de 2500 Tonnes. (Repair of the Cylinder in a 2500-Ton Hydraulic Press.) J. Coche. *Soudure et Techniques Connexes,* v. 1, Nov.-Dec. 1947, p. 243-246.

Welding processes used in repairing press.

**22b-73. La Soudure a l'Arc Sous-Marine dans les Travaux de Renflouage du S.S. "Patrai", Cargo de

2800 Tonnes. (Underwater Arc Welding in the Job of Refloating the S. S. Patrai, a 2800-Ton Cargo Vessel.) A. Bartoux. *Soudure et Techniques Connexes,* v. 1, Nov.-Dec. 1947, p. 246-259.

22b-74. Arc Welding of Cast Iron. T. E. Kihlgren and L. C. Minard. *American Foundrymen's Assoc., Preprint No.* 47-54, 1947, 10 pages.

General considerations involved in the arc welding of cast iron with nickel electrodes. Effects of such variables as preheat, superimposition of beads in multipass welds and bead sequence on properties of welded cast iron. A preliminary torch "degassing" procedure is described for improving the welding response of castings containing dissolved gas. Field applications.

22b-75. Silver Brazing Threadless Malleable Fittings. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 98-100.

Procedures which were introduced by Stanley G. Flagg & Co., and their applications and advantages over threaded joints.

22b-76. Welding Petcock Wrenches on Simple Machine Speeds Process. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 162.

22b-77. Preheating for Welding Is Heat Treatment. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 162, 164.

22b-78. Metallurgical Properties of High Yield Strength Seamless Line Pipe. A. B. Wilder and J. D. Tyson. *Petroleum Engineer,* v. 19, Feb. 1948, p. 138, 141, 144, 146, 148, 150, 152.

Previously abstracted from *Welding Journal,* v. 26, Oct. 1947, p. 872-880. See item 3-344, R.M.L., v. 4, 1947.

22b-79. Tooling and Operations in Vending Machine Making. *Sheet Metal Worker,* v. 39, Feb. 1948, p. 53-55.

Includes several types of welding and complicated jigs as well as press operations.

22b-80. Ore Bridge Made From Welded Assemblies. Thomas M. Fallon. *Welding Engineer,* v. 33, March 1948, p. 44-45.

Welded construction was found to have many advantages for a giant traveling ore bridge, capable of handling up to 900 tons of ore per hour.

22b-81. A.W.S. Electrode Classifications. Part II—E-6013 and Flat-Position Electrodes. *Welding Engineer,* v. 33, March 1948, p. 67.

An engineering data sheet.

22b-82. Tests of Various Designs of Welded Hatch Corners for Ships. E. Paul DeGarmo. *Welding Journal,* v. 27, Feb. 1948, p. 50s-68s; discussion, p. 69s-70s.

Results of tests on ten full-scale welded hatch corners to determine the effectiveness of various modifications used on "Liberty" ships. In addition, three new designs were investigated. A design similar to the hatch corners on early Liberty ships was used as basis for comparison. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22b-83. Proposed Specification for Steel St.L.37 for Welded Bridge Construction. P. Schoonmaker and Others. *Welding Journal,* v. 27, Feb. 1948, p. 117. Translated from *Laschtechnick,* v. 13, Oct. 1947, p. 93-94.

Tests proposed by a committee of the Netherlands Welding Society in which allowable design stress is same in weld as in base metal.

22b-84. The Uses of Flux-Injection Cutting for Stainless Steels. G. E. Bellew. *Welding Journal,* v. 27, Feb. 1948, p. 118-124.

The use of a flux feeder unit in which a chemical flux is used to permit fluid slagging of refractory oxides. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22b-85. Threadless Fittings. *Welding Journal,* v. 27, Feb. 1948, p. 156.

Flagg-Flow socket-type fitting for brazing to steel or wrought iron.

22b-86. The Work of the Ship Structures Committee. Ellis Reed-Hill. *Welding Journal,* v. 27, Feb. 1948, p. 33s-34s.

Introductory remarks. (Presented at Ship Structure Research Session Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22b-87. The Effect of Temperature and Welding Conditions on the Strength of Large Welded Tubes. G. E. Troxell, E. R. Parker, H. E. Davis and A. Boodberg. *Welding Journal,* v. 27, Feb. 1948, 34s-49s; discussion, p. 49s, 70s.

Methods and results of tests on 12 welded 20-in. diameter by 10-ft. long tubes made of hull-quality steel. Results of various supplementary tests made to study fracture phenomena observed during tube tests.

22b-88. Hard Surfaced Bits Used on Oil Shale. *Engineering and Mining Journal,* v. 149, March 1948, p. 94.

Method of surfacing.

22b-89. Submerged Melt Welding of Hardenable Steels. E. A. Clapp and E.

L. Frost. *Steel Processing,* v. 34, Feb. 1948, p. 80-83.

Previously abstracted from *Welding Journal,* v. 26, Dec. 1947, p. 1079-1082. See item 22-764, R.M.L., v. 4, 1947.

22b-90. The Metallurgical Aspects of Fusion Welding in Relation to the Weldability of Steels. (Continued.) H. Granjon. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 367-371.

The thermal cycle in welding, including methods for investigating it and its typical features.

22b-91. Design and Construction of Arc Welded Steam Platens. H. O. Lehman. *Rubber Age,* v. 62, Feb. 1948, p. 545-546.

Platens are those used on hydraulic presses for molding or curing of rubber, plastic, and plywood products. Substantial savings in fabrication cost over other methods are demonstrated. (This study won an award in the recent James F. Lincoln Arc Welding Foundation's Design-for-Progress Award Program.)

22b-92. Continuous Welded Rail. I. H. Schram and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 404-405.

Tables showing number of installations, removals, and renewals for each type of welding; and also the number of failures which occurred.

22b-93. Metallurgical Aspects of Carbon Steel Spot Welding. J. Heuschkel. *Steel,* v. 122, March 15, 1948, p. 93-95, 124, 126, 128; March 22, 1948, p. 67-69, 104, 106, 109.

Previously abstracted from *Welding Journal,* v. 26, Oct. 1947, p. 560s-582s. See R.M.L., v. 4, 1947, item 22-647.

22b-94. Powder Cutting as a Production Tool. D. H. Fleming. *Welding Journal,* v. 27, March 1948, p. 181-187.

Application to stainless steel. The process consists of introducing a finely divided iron-rich powder into the cutting-oxygen stream. The powder unites with oxygen and burns, liberating large quantities of heat and forming superheated molten particles of iron oxide. (Presented at 28th annual meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22b-95. Oxy-Acetylene Production Cutting in Steel Mills. A. H. Yoch and W. Begerow. *Welding Journal,* v. 27, March 1948, p. 188-192.

Advantages of mechanized oxy-acetylene cutting, reviewing briefly cold cutting, billet nicking, and revealing new advances in hot cutting which make possible faster cutting with less skill. (Presented at 28th annual meeting, A.W.S., Chicago, week of Oct. 19, 1947.)

22b-96. Extent of Peening Weld Deposits for Stress Relief. Joe Lawrence Morris. *Welding Journal,* v. 27, March 1948, p. 148s-158s.

Tests to determine how much of a weld deposit should be worked with a peening tool to obtain stress relief in the joint, maintain dimensions in the over-all structure, and correct distortion. Analyzes known variables involved in such a procedure. 66 ref.

22b-97. A Fabricated Heavy Plate Bending Machine. *Engineer,* v. 185, Feb. 27, 1948, p. 214-215. Condensed from paper by H. B. Fergusson and others for James F. Lincoln Arc Welding Foundation contest.

British-made machine for use in cold bending of plates up to 3½ in. and hot bending up to 5 in. thick, to 2/3 of a circle.

22b-98. New High-Alloy Hard Facing Materials Adapted to Automatic Arc Welding. *Materials & Methods,* v. 27, March 1948, p. 78-79.

Compositions, properties, and applications of eight new hard facing materials developed by Stoody Co. Flexible tubular weld rod applicable to automatic arc welding.

22b-99. The Stainless Steels. Part V. Welding of the Stainless Steel Compositions. Lester F. Spencer. *Steel Processing,* v. 34, March 1948, p. 127-133, 153, 156-157.

22b-100. Electrodes of High Efficiency for Manual Arc Welding. (In Russian.) A. M. Gofner, V. I. Kuznetsov, M. I. Kunis, and N. N. Kryukovskii. *Avtogennoe Delo* (Welding), Nov. 1947, p. 21-23.

Powdered steel as a component of electrode coatings increases the efficiency considerably. Preparation method is similar to those commonly used.

22b-101. Deformation of Welded T-Shaped Bars. (In Russian.) N. O. Okerblom. *Avtogennoe Delo* (Welding), Dec. 1947, p. 1-5.

Development of relationships between longitudinal deformation, cross-sectional area, geometry, and conditions of welding.

22b-102. Applicability of Automatic Structural Welding of Low-Carbon Steels at Low Temperatures. (In Russian.) B. I. Medovar and A. E. Asnis. *Avtogennoe Delo* (Welding), Dec. 1947, p. 15-17.

Testing of a specimen welded under normal conditions and one welded at −20° C. showed 15 to 20% lower impact strength of the latter. However, cold brittleness was not increased.

22b-103. Cold Brittleness of Welded Structures at Low Temperatures. (In Russian.) A. S. Ogievetskii. *Avtogennoe Delo* (Welding), Dec. 1947, p. 18-19.

Factors causing the cold brittleness and a series of remedies.

22b-104. Gas Pressure Welding in the Construction of Pipelines. (In Russian.) A. S. Fal'kevich. *Avtogennoe Delo* (Welding), Dec. 1947, p. 20-24.

Equipment and procedures.

22b-105. Fusion Welding and Cutting as Used With Design, Fabrication, and Maintenance of Steam Locomotive Boilers and Tenders. *Master Boiler Makers' Association, Official Proceedings of the 1947 Annual Meeting,* 1947, p. 74-82; discussion, p. 82-90.

A committee report.

22b-106. Fusion Welding and Cutting as Used With Design, Fabrication, and Maintenance of Steam Locomotives, Boilers and Tenders. Willard K. Fohl. *Master Boiler Makers' Association, Official Proceedings of the 1947 Annual Meeting,* 1947, p. 91-93; discussion, p. 93-101.

Data on welding properties of Ni steel, C-Mo steel, Mn-V steel, and Si-Mn steel.

22b-107. Examen General du Probleme des Tensions Internes de Soudure. (General Examination of the Problem of Internal Welding Pressures From the Point of View of Their Elimination or Utilization.) E. Varriot. *Soudure et Techniques Connexes,* v. 2, Jan.-Feb. 1948, p. 12-16.

The theory and the possibility of using them to improve the resistance of steels.

22b-108. Carbon and Alloy Steels; Factors Governing Their Weldability. Part 2. T. L. H. Butterfield. *Welding,* v. 16, Feb. 1948, p. 61-66.

Thermal effects; hardenability curves as a guide to weldability; use of S-curves; various tests for evaluating weldability.

22b-109. Factors in Production Control of Arc Welding. D. M. Kerr, *Transactions of the Institute of Welding,* v. 11, Feb. 1948, p. 35-42.

Various factors are tabulated, charted, and discussed, especially as applied to manual arc welding. (Presented at meeting of West of Scotland Branch, Institute of Welding, Glasgow, Nov. 1946.)

22b-110. Three-Part Refrigerator Liners Joined in One Operation. *Steel,* v. 122, March 29, 1948, p. 78.

Production of 20-gage steel, food-compartment liners in the plant of Seeger Refrigerator Co., St. Paul, runs between 90 to 180 units per hour since installation of welder.

22b-111. That New Look in Boiler Shops. John A. Weaber, Jr. *Industry and Welding,* v. 21, April 1948, p. 26-29, 56.

Substitution of welding for riveting by Union Boiler and Mfg. Co., Lebanon, Pa., on stainless as well as carbon steel.

22b-112. Profitable Brazing Application. S. Griswold Flagg. *Industry and Welding,* v. 21, April 1948, p. 45, 48-49

Development of threadless malleable fittings for small-diameter piping installations.

22b-113. Welds on Cast Iron. H. Seymour. *Mining Magazine,* v. 78, March 1948, p. 142-143.

22b-114. Ryan Welding Innovations. William P. Brotherton. *Western Machinery and Steel World,* v. 39, March 1948, p. 106-110.

Some of the unusual methods developed by Ryan Aeronautical Co. for fabrication of stainless-steel aviation exhaust systems.

22b-115. Fontana Pipe Mill. *Western Machinery and Steel World,* v. 39, March 1948, p. 113.

Kaiser's new mill which will turn out 90,000 to 125,000 tons of pipe annually in sizes ranging from ½ to 4 in. in diameter. Pipe is produced by shaping and welding.

22b-116. Electric Arc Welding Against Pressure. D. K. Stephens. *Petroleum Engineer,* v. 19, March 1948, p. 141-142, 145.

Method used by Panhandle Eastern Pipe Line Co. for welding its natural-gas lines.

22b-117. Saving Weight in a Diesel's Welded Underframe. Leonard Pompa. *Railway Mechanical Engineer,* v. 122, March 1948, p. 61-63.

The redesign and fabrication of a 2000-hp. diesel-electric locomotive underframe which resulted in a 12,000-lb. weight saving.

22b-118. An All-Welded Hopper Wagon. *Welder,* v. 17, Jan.-March 1948, p. 2-4.

British railroad hopper car.

22b-119. Stainless Steel Lining of Vessels. *Welder,* v. 17, Jan.-March 1948, p. 20-22.

Techniques used in relining some vessels.

22b-120. An All-Welded Steel Water Tower. *Welder,* v. 17, Jan.-March 1948, p. 17-18.

Structural details.

22b-121. British Shipbuilding—Part 5. Developments at Cammell Laird &

Co., Ltd.. *Welding,* v. 16, March 1948, p. 98-105.

Development of welding in these yards and present activities.

22b-122. Carbon and Alloy Steels; Factors Governing Their Weldability. T. L. H. Butterfield. *Welding,* v. 16, March 1948, p. 113-120.

This third section discusses the relationship of maximum hardness and hardenability to weldability. Rigid butt-joint test data for a series of steels.

22b-123. Fabricated Bakery Equipment; Details of Welded Design. J. K. Johannesen. *Welding,* v. 16, March 1948, p. 126-128.

22b-124. The Stainless Steels. Part V-A. Welding of the Stainless Steel Compositions. Lester F. Spencer. *Steel Processing,* v. 34, April 1948, p. 198-203, 218.

19 ref.

22b-125. The Powder Process in Stainless Steel Production. C. J. Burch and E. M. Holub. *Blast Furnace and Steel Plant*, v. 36, April 1948, p. 443-446. A condensation.

Methods, apparatus, and applications. with particular reference to flame cutting. (Presented at the Annual Meeting A.I.S.E., Pittsburgh, Sept. 23-25, 1947.)

22b-126. 292-Ft. All-Steel Reservoir. A. N. Carter. *Welding Engineer,* v. 33, April 1948, p. 33-35, 39.

Construction of a ten-million gallon covered steel reservoir with an all-welded shell.

22b-127. Torch-Brazed Pipe Fittings. Clyde B. Clason. *Welding Engineer,* v. 33, April 1948, p. 45.

How socket-type pipe fittings of black malleable iron now enable steel or wrought-iron pipe to be joined economically by silver brazing.

22b-128. Automatic Hard Facing. H. W. Sharp. *Welding Engineer,* v. 33, April 1948, p. 46-48.

How hard facing electrodes are now made in the form of continuous steel-tube coils containing various alloying elements.

22b-129. Making a Point by Pulling Teeth. David Sciaky. *Applied Hydraulics,* v. 1, April 1948, p. 14-15, 18

An unconventional use of a resistance welding machine equipped with air clamping and locating cylinders to form harrow-tooth profiles.

22b-130. Methods of Joining Cast Iron Pipe. (Concluded.) J. E.York. *Heating and Ventilating,* v. 45, April 1948, p. 86-90.

Couplings, clamps, and saddle joints for cast-iron and steel pipe and flanged joints for cast-iron pipe.

22b-131. How to Repair Leaks by Arc Welding When Fluid Crackers Are in Operation. Robert H. Darling. *Petroleum Processing,* v. 3, April 1948, p. 349-350.

Techniques used.

22b-132. More Output and Less Cost With Well-Planned Fixtures. Clarence H. Hopper. *Production Engineering & Management,* v. 21, April 1948, p. 55-57.

How substantial savings in the cost of fabricating tubular bus-seat frames have been made at Oneida Products by use of improved welding fixtures.

22b-133. Arc Welding Stainless Impellers. Walter L. Elliott and George Handyside. *Steel,* v. 122, April 12, 1948, p. 82-84.

Technique which is claimed to have succeeded in retaining all the corrosion-resistant properties of the parent metal, producing a weld with equal corrosion-resistant properties, and at the same time preventing failure at the joint and keeping distortion to a minimum.

22b-134. Conversion From Spot to Butt Joining Steps Up Wrench Production. *Steel,* v. 122, April 19, 1948, p. 98.

22b-135. "Shucks, We'll Do It Right Here!" Frank Tucker. *Weld,* v. 4, April 1948, p. 6-7.

Difficult welding-repair job on sections of 30-in. cast-iron pipe. It consisted of cutting a large oval section out of a cement-lined pipe 1-in. thick and welding a 1½ x 2-in. steel flange between the bell section and the neck of the pipe.

22b-136. Waldrip Builds Shell Rig for Swift Travel and Erection in 24 Min. —All-Welded Construction Does It! *Weld,* v. 4, April 1948, p. 14-15.

New portable rig built for Shell Oil Co.

22b-137. Techniques of Quality Welding of Plain Carbon Steel Castings. E. LaGrelius and J. D. Wozny. *American Foundrymen's Association, Preprint No.* 48-8, 1948, 10 pages.

Object was to develop superior welding techniques for plain-carbon steel castings and to determine the metallurgical effects of size of weld, section size welded, and subsequent heat treatments on hardness and microstructure. It was found that mineral or lime-coated electrodes generally produce sound welds free from pinhole porosity. Electrodes were developed whose deposits met the minimum required physical properties of plain-carbon steel castings.

22b-138. Results of Conference on Automatic Welding Under Flux, Kiev, October 3-6, 1947. (In Russian.) E. O. Patona. *Avtogennoe Delo* (Welding) Jan. 1948, p. 1-21.

New methods developed in the U.S.S.R. and abroad, especially those adaptable to large-sized jobs. Production of fluxes from blast-furnace slags is recommended. Future research goals.

22b-139. The Sulphur Reaction and Hot Cracking During Automatic Welding of Low-Carbon Steel Under Flux. (In Russian.) K. V. Lynbavskii. *Avtogennoe Delo* (Welding), Jan. 1948, p. 22-26.

Results of investigation, show that hot cracking depends not only upon sulphur concentration but on the form in which it is present. MnS or a solid solution rich in MnS is said to be less harmful than iron sulphides.

22b-140. Technology of Butt Welding of Steel Rings of Large Diameter and Cross Section. (In Russian.) V. I. Korovkin. *Avtogennoe Delo* (Welding), Jan. 1948, p. 27-28.

Special method and optimum conditions.

22b-141. Spot Welding of Heads to Pins. (In Russian.) B. G. Filippov. *Avtogennoe Delo* (Welding), Jan. 1948, p. 27.

Special jig.

22b-142. Control of the Tempering of Structural Steel During Welding. (In Russian.) N. N. Rykalin and L. A. Fridlyand. *Avtogennoe Delo* (Welding), Feb. 1948, p. 3-11.

Details of calculation of proper arc welding conditions (manual and automatic) for different types of joints and seams.

22b-143. Deformation of Plates of Carbon and Alloy Steels During Automatic Welding Under Flux. (In Russian.) V. M. Rybakov. *Avtogennoe Delo* (Welding), Feb. 1948, p. 15-20.

An extensive investigation of the effects of steel composition, current density, rate of welding, arc voltage, position of electrodes, and electrode composition.

22b-144. Use of a Special Heating Torch During Straightening of Welded Structures. (In Russian.) A. Ya. Brodskii. *Avtogennoe Delo* (Welding), Feb. 1948, p. 20-22.

Torch and method of its use. Mathematical calculations for the theoretical heat distribution and torch design for welding of cylindrical tubes.

22b-145. A Method for Automatic Welding of Riveted Joints Under Flux. (In Russian.) V. V. Vershinskii and V. N. Dubov. *Avtogennoe Delo* (Welding), Feb. 1948, p. 25-26.

Method and equipment.

22b-146. Production of Cutting Tools by Welding-on of a Cutting Edge Using Special Electrodes. (In Russian.) V. V. Danilevskii. *Avtogennoe Delo* (Welding), Feb. 1948, p. 26-27.

Compositions of electrode cores and coatings. (Only the qualitative composition is given for the latter.)

22b-147. Safety Precautions During Repair of Gasoline Tanks by Electric Arc Welding. (In Russian.) D. E. Bondarev and A. V. Bibikov. *Avtogennoe Delo* (Welding), Feb. 1948, p. 28-30.

22b-148. The Manufacture and Application of Composite Plates. O. R. Carpenter. *Welding Journal,* v. 27, April 1948, p. 279-287.

Previously abstracted from *Steel,* v. 121, Dec. 22, 1947, p. 64-66, 83-84. See item 22-782, R.M.L., v. 4, 1947.

22b-149. Welding in Machine Design. J. Mikulak. *Welding Journal,* v. 27, April 1948, p. 290-298.

Fundamental design factors for ferrous welding design.

22b-150. Carbon and Alloy Steels; Development of Electrodes for Welding High Tensile Steels. T. L. H. Butterfield. *Welding,* v. 16, April 1948, p. 152-156, 162.

The causes of cold cracking in alloy steels, the hydrogen-inclusion theory, and the way in which electrodes have been developed to overcome some of the difficulties encountered.

22b-151. Welded Railway Wagons; Use of High Tensile Steel. *Welding,* v. 16, April 1948, p. 171-173.

22b-152. Effect of Variables in Welding Technique on the Strength of Direct-Current Metal-Arc-Welded Joints in Aircraft Steel. Part II. Repeated-Stress Tests of Joints in S.A.E. 4130 Seamless Steel Tubing. C. B. Voldrich and E. T. Armstrong. *National Advisory Committee for Aeronautics, Technical Note No.* 1262, April 1948, 85 pages.

Tests were made on joints in S.A.E. 4130, seamless-steel tubing. Variables included type of electrode, speed of welding, current, position, amount of preheat, and other factors which in turn controlled the weld contour, penetration, and depth of the heat-affected zone. A range of joint design was also investigated. Fatigue data showed that stress concentrations due to weld geometry were the predominating factors in determining endurance life. Previous

concepts relative to the behavior of fillet and butt welds were confirmed.

22b-153. Getting Ready to Weld. *Linde Tips,* v. 27, April 1948, p. 29-32.
How to prepare steel sheet or plate for welding. Hints on flame adjustment.

22b-154. How to Make Them Last. *Linde Tips,* v. 27, April 1948, p. 32-33.
Increase life of farm equipment parts by hard-facing.

22b-155. Coupling Allows Welding Pipe in Service, Saves up to 24 Hours in Repair Time. *Petroleum Processing,* v. 3, May 1948, p. 406-407.

22b-156. New Welding Techniques. Frank Charity. *Modern Machine Shop,* v. 20, May 1948, p. 146-148, 150, 152, 154.
Use of heliarc welding for stainless and carbon-steel products.

22b-157. Jigs and Fixtures Facilitate Economic Mass Welding. O. L. Dubie. *Steel,* v. 122, May 3, 1948, p. 90-93.
Actual examples which show how the use of positioners and fitting and holding devices saves time and money.

22b-158. Manual Hidden Arc Welding Speeds Manufacture of Chemical and Refinery Equipment. J. L. Wolcott. *Steel,* v. 122, May 10, 1948, p. 102, 112.

22b-159. Brazing Cast Iron; Recent American Developments with Great Potentialities. *Automobile Engineer,* v. 38, April 1948, p. 149-151. Based on paper by S. D. Heron.
Cleaning and surface-preparation process developed by Kolene Corp., Detroit, by which both machined and unmachined cast iron surfaces are prepared for silver brazing. The work is suspended in molten salts, and surface impurities are removed by alternate oxidation and reduction cycles induced by reversal of the direction of current flow. Development of more satisfactory designs of sodium-cooled pistons and cylinder blocks for application of the process.

22b-160. Tuna Clipper. Gerald Eldridge Stedman. *Welding Engineer,* v. 33, May 1948, p. 33-36.
Welded construction of newer models of above fishing vessels.

22b-161. Three-Dimensional Flame-Cutting. O. L. Bailey. *Welding Engineer,* v. 33, May 1948, p. 52-53.
How intricate shapes can be cut in one piece by first cutting the plan view, rotating the part 90 degrees and then cutting the elevation. These "burnments" are replacing numerous items formerly forged or cast.

22b-162. Welders on the Assembly Line. T. B. Jefferson. *Welding Engineer,* v. 33, May 1948, p. 56-57.
Welding phases of their fabrication.

22b-163. All-Welded Refrigerator Cars. *Welding Engineer,* v. 33, May 1948, p. 58-60, 62.
Production from low-alloy steel.

22b-164. The Effect of Welding and Other Local Heating Processes on Residual Stress and Dimensional Changes in Steel. Leon C. Bibber. *Steel Processing,* v. 34, May 1948, p. 251-255, 268.
Describes effects and clarifies them by means of charts and diagrams. How to compensate for them. (Condensed from paper presented to A.S.C.E., Pittsburgh, April 7, 1948.)

22b-165. Electric Flash Welding. *Steel,* v. 122, May 17, 1948, p. 84, 114.
Machine which heats the edges of hot-rolled strip steel and forges them together with an upsetting impact of 12,000 psi., on a new continuous pickle line. Flash is then trimmed off leaving a continuous strip of homogeneous metal.

22b-166. Development of Arc Welded Gas Holder. Arthur C. Thompson. *Welding Journal,* v. 27, May 1948, p. 363-368.
Savings of 15% over riveted construction are claimed.

22b-167. Creative Architectural Design With Welded Rigid Frames From Studies of Living Structures. Martin P. Korn. *Welding Journal,* v. 27, May 1948, p. 369-375.
Recent developments in design of welded structures.

22b-168. Ductility of Steels for Welded Structures. Augustus B. Kinzel. *Welding Journal,* v. 27, May 1948, p. 217s-234s.
Previously abstracted from *Metal Progress,* v. 52, Nov. 1947, p. 795-799. See item 22-757, R.M.L., v. 4, 1947.

22b-169. Factors Affecting the Weldability of Carbon and Alloy Steels. Development of Test Procedure and Effect of Composition. Part I. C. M. Offenhauer and K. H. Koopman. **Effect of Variations in Welding Technique on the Transition Behavior of Welded Specimens. Part II.** Clarence E. Jackson and William J. Goodwin. *Welding Journal,* v. 27, May 1948, p. 234s-266s
Investigations reported have been broadly described and summarized in the 1947 Campbell Memorial Lecture by A. B. Kinzel, p. 317s-347s.

Part I is an evaluation of methods of test and the effects of composition on the embrittling temperature; and Part II is a study of the effect of variations in welding technique on the embrittling temperature of the welded specimens. Extensive data are tabulated and charted. (Presented at 28th annual meeting, A.W.S., Chicago, week of Oct. 18, 1947.)

22b-170. The Brittle Transition Temperatures of Various Low-Carbon Steels Welded by the Same Method. N. Grossman and C. W. MacGregor. *Welding Journal,* v. 27, May 1948, p. 267s-271s.

Seven low-carbon steels were investigated as to distribution of transition temperatures for different locations from the center line of the weld. All of the plates were welded by the Union melt process. Tests indicated that the weld metal was, in all cases, more ductile than the best base-plate material.

22b-171. Pipe Forming After Welding Cuts Costs for West Coast Firm. *Steel,* v. 122, May 24, 1948, p. 98-100.

Application of continuous joining and shaping on mandrels to produce irrigation tubing.

22b-172. Residual Stress and Dimensional Changes Caused by Welding and Other Local Heating Processes. *Steel,* v. 122, May 24, 1948, p. 107. A condensation.

Previously abstracted from *Steel Processing,* v. 34, May 1948, p. 251-255, 268. See item 22b-164, 1948.

22b-173. "TsM-7" Electrodes. (In Russian.) A. A. Alov. *Avtogennoe Delo* (Welding), v. 3, March 1948, p. 1-5.

A new type of coated electrode for welding carbon steel and properties of seams welded with it. Methods of production and use. The coating contains hematite, granite, ferromanganese, starch, and sodium silicate.

22b-174. Application of "TsM-7" Electrodes for Rapid Manual Welding. (In Russian.) F. I. Pashukanis. *Avtogennoe Delo* (Welding), v. 3, Marcn 1948, p. 5-10.

After investigating several types of Russian coated electrodes, it was found that the TsM-7 electrodes with an extra heavy coating were the most convenient. Compositions and optimum welding conditions.

22b-175. Determination of Conditions for Automatic Butt Welding of Non-Beveled Joints. (In Russian.) M. R. Shraerman. *Avtogennoe Delo* (Welding), v. 3, March 1948, p. 10-15.

Develops a series of nomographs which permit rapid determination of optimum conditions for automatic butt welding.

22b-176. Automatic Welding Under Flux Using Carbon Electrodes. (In Russian.) N. A. Ol'Shanskii. *Avtogennoe Delo* (Welding), v. 3, March 1948, p. 16-18.

Proposes use of carbon electrodes for welding thin carbon steel and nonferrous metal sheets (2 to 4 mm.). Optimum conditions and recommended procedures.

22b-177. L'Emploi du Chalumeau et de l'Arc Electrique dans les Travaux sous-marins. (Use of Blow Torch and Electric Arc Under Water.) M. Lebrun. *Soudure et Techniques Connexes,* v. 2, March-April 1948, p. 47-58.

Modern methods of gas and electric welding and cutting under water.

22b-178. La Construction des Grands Reservoirs a Hydrocarbures Entierement soudes. (Construction of All-Welded Tanks for Storage of Hydrocarbons.) R. Large. *Soudure et Techniques Connexes,* v. 2, March-April 1948, p. 59-69.

Methods are based on work done in the U. S. and France.

22b-179. High Manganese Steel and Its Deposition by Arc Welding. R. W. Edwards. *Metallurgia,* v. 38, May 1948, p. 12-14, 57.

The characteristics of high Mn steel and its deposition by arc welding and some of the problems of perfecting a suitable electrode and technique for building up work-hardening surfaces. 13 ref.

22b-180. Welding of Drop-Shaped Tank. (In Russian.) M. Va. Shushenkova. *Avtogennoe Delo,* (Welding), v. 3, March 1948, p. 22-25.

Methods for construction of flattened sphere (oblate spheroid).

22b-181. Shipyard Management of Welding. W. R. Mellanby. *Transactions of the Institute of Welding,* v. 11, April 1948, p. 52-65; discussion p. 63-65, 82.

The development and control of welding, economic considerations of welding and riveting, the present methods of design, the value of prefabrication, and the future of welding.

22b-182. Ore and Coal Bridges. Geo. F. Wolfe. *Iron and Steel,* v. 21, May 13, 1948, p. 189-195.

A welded design with 15-ton grab. Extensive details of design and fabrication of the components.

22b-183. New Car Welders Promote Economy. *SAE Journal,* v. 56, June

1948, p. 34-35. Based on "Modern Welding Procedures in Building Car Bodies," by E. O. Courtemanche.
Use of multitransformer and poke-spot-welding methods.

22b-184. Submerged Melt Welding Applied to Hardenable Steels. E. A. Clapp and E. L. Frost. *Canadian Metals & Metallurgical Industries,* v. 11, May 1948, p. 19-21, 42.

22b-185. Bronze Welding of Cast Iron; Principles and Technique. E. Ryalls. *Welding,* v. 16, May 1948, p. 203-210.
Treated from practical point of view.

22b-186. Where Each Welding Method Fits the Operating Engineer's Job. *Operating Engineer,* v. 1, June 1948, p. 30-31.
Use of gas, arc, forge, braze, and thermit welding in repair of boiler and power-plant equipment.

22b-187. Construction and Maintenance of Railroad Equipment by Submerged and Gas-Shielded Electric Welding. N. G. Schreiner and J. M. Tippett. *Welding Journal,* v. 27, June 1948, p. 431-437.
Advantages of welded construction and various applications.

22b-188. Giant Test Chamber for Navy Underwater Equipment Tests. *Welding Journal,* v. 27, June 1948, p. 476, 478.
220-ton welded pressure vessel.

22b-189. Spot Welding Assembles Bath Tubs. *Welding Journal,* v. 27, June 1948, p. 478, 480.

22b-190. Tin Can Boat. Henry Schutz. *Welding Engineer,* v. 33, June 1948, p. 43, 56.
Navy pontoons joined by connector plates made a welded barge of unusual buoyancy for around $6600.

22b-191. Milk Tanks Welded From Stainless-Clad Steel. Lewis B. Adams. *Welding Engineer,* v. 33, June 1948, p. 52-54.

22b-192. Cast Glass-to-Metal Seals for High-Voltage Bushings. J. K. Easley. *Electrical Manufacturing,* v. 41, June 1948, p. 112-115.
Properties of a borosilicate glass with a coefficient of expansion matched to that of 42%-Ni iron to produce a reliable hermetic seal on large apparatus subject to wide variations in temperature.

22b-193. Semi-Automatic Submerged Arc Welding. Vladimir Peters. *Industry and Welding,* v. 21, June 1948, p. 63-64, 66.
Advantages and applications.

22b-194. Multiple Welding Procedures Speed and Improve Quality of Motor Car Body Joints. E. O. Courtemanche. *Steel,* v. 122, June 14, 1948, p. 93-95.
Also abstract from *SAE Journal,* v. 56, June 1948, p. 34-35. See item 22b-183, 1948.

22b-195. Faults to Avoid in Torch-Cutting. *American Machinist,* v. 92, June 17, 1948, p. 145.
A correctly made cut and various defective cuts.

22b-196. Electric Furnace Brazing Facilitates Manufacture of Insecticide Bombs. *Industrial Heating,* v. 15, June 1948, p. 942, 944, 946, 962.

22b-197. Simple Spot Welding Equipment Assembles Bath Tubs. *Steel Processing,* v. 34, June 1948, p. 304-305.

22b-198. Flame Cutting of Stainless Steel. R. Groves. *Machinery Lloyd,* (Overseas Edition), v. 20, June 5, 1948, p. 68-71.
Use of flux-injection method.

22b-199. New Machine Eliminates Stainless Flange Welds. Harry Frankfort. *Chemical Industries,* v. 62, May 1948, p. 752-753.
New process known as "cold Vanstoning" and the machine developed to form joints by rolling the end of the tubing to the proper form. It makes possible lightwall stainless-steel piping systems without welds and eliminates fire hazards and costly shutdowns during installation and replacement.

22b-200. Making the Most of Oxygen Cutting. C. G. Bainbridge. *Engineers' Digest* (American Edition), v. 5, May-June, 1948, p. 165-168, Condensed from *Iron and Coal Trades Review,* v. 166, Jan. 30, 1948, p. 205-211.
Oxygen consumption, nozzle size, cutting speed, fuel gases, cost of cutting, reducing cutting costs, and accuracy of cutting.

22b-201. Playboy Preview. Walter Rudolph. *Welding Engineer,* v. 33, July 1948, p. 38-39.
Fabrication of all-welded automobile.

22b-202. Manual "Hidden-Arc" Process. J. S. McKeighan. *Welding Engineer,* v. 33, July 1948, p.40, 43.
New semiautomatic welding method reduces the cost of both longitudinal and circumferential welds in glass-lined chemical reactors.

22b-203. Pressure-Welded Aircraft. Fred M. Burt. *Welding Engineer* v. 33, July 1948, p. 44-47.
Development of the process for production of medium-carbon, low-alloy-steel, tubular aircraft members.

22b-204. Cages for Concrete Reinforcement. Herbert Leopold. *Welding Engineer,* v. 33, July 1948, p. 52-53.

Fabrication of cage-like reinforcement for construction of concrete pipe of high bursting strength, on an Australian welding machine. An ingenious combination of spot and seam welding is used to produce about 200 welds per minute, or about 5 ft. of cage length.

22b-205. Permissible Loads for Fillet Welds Per Inch of Length. Leo Berner. *Welding Engineer,* v. 33, July 1948, p.67.

22b-206. Investigation Into Spacing of Spotwelds. H. Dudley Wimer, Jr. *Aero Digest,* v. 57, July 1948, p. 66-67, 117-118, 120.

The problem of correct spacing of spot welds in stainless steel. Standards have been setup, but nonstandard practices in the form of larger or more closely spaced welds are common where strength is most important. "Special Weld Spacing Chart" developed from a mathematical consideration of a proximity effect and from results of a number of laboratory tests.

22b-207. Precision Welding Jigs Simplify Stove Assembly. Walter Rudolph. *American Machinist,* v. 92, July 1, 1948, p. 82-84.

22b-208. Manual Hidden Arc Welds Hoist Cylinders 300% Faster. Al Blewett. *American Machinist,* v. 92, July 1, 1948, p. 106-107.

Replaces conventional hand welding with manual hidden-arc welding. Improvement in weld quality eliminated leaks caused by porosity and facilitated subsequent machining.

22b-209. Tool Construction and Maintenance by Welding. E. H. Girardot. *Steel,* v. 123, July 5, 1948, p 80-82, 84.

Manhours, materials, and production delays can be saved by proper application of different types of welding in making and repairing tools, dies, and fixtures.

22b-210. Manual Hidden Arc Welding Cuts Welding Time by 65 Pct. E. A. Hess. *Iron Age,* v. 162, July 8, 1948, p. 78-79.

Procedure utilizing extremely high current densities in order to reduce welding time on frame girders. Edge preparation is reduced or eliminated and weld quality is reported to be excellent.

22b-211. Butt Welded Chains; Details of Specialized Equipment and Methods. *Welding,* v. 16, June 1948, p. 230-235, 248.

Methods and equipment used by British firm, including use of photoelectric cells for the control of welding temperature. Heat treatment and testing of the chains.

22b-212. Some Essentials in Oxy-Acetylene Pipeline Welding. E. Fuchs. *Welding,* v. 16, June 1948, p. 236-248.

Preparation of pipes of varying diameters for welding. Methods of matching, alignment, and clamping; attachment of branches.

22b-213. Major Operations on Oil Tankers; Repairs to a Severely Damaged Ship. (Continued.) J. K. Johannesen. *Welding,* v. 16, June 1948, p. 249-259.

Large-scale welding repairs to damaged tankers. Numerous diagrams.

22b-214. The Weldability of Steels, and a New Weld-Cracking Test. P. L. J. Leder. *Engineering,* June 11, 1948, p. 573-575; June 18, 1948, p. 582-583. A condensation.

Concerned with cracking in the heat-affected area of the parent plate immediately adjacent to the weld, and primarily with the weldability of high-tensile steels. Various types of weld-cracking tests. A new test of the tied butt weld type measures the stress across the weld directly, instead of measuring stresses arising out of thermal expansion and contraction of the test plates. Results obtained with various types of welding electrodes containing different amounts of hydrogen in the coating.

22b-215. Some Modern Developments in Steels for Welded Structures. W. Barr. *Metallurgia,* v. 38, June 1948, p. 79-84.

Weld hardening, weld cracking, and mechanical properties of welds in different steels. Welding armor plate; the phenomenon of brittle fracture which caused failure of several American welded ships.

22b-216. British Welding Research Association. *Engineer,* v. 185, June 18, 1948, p. 589-590.

New research facilities.

22b-217. Automatic Welding of Steel Mill Equipment. W. W. Scherer and H. J. Ralston. *Iron Age,* v. 162, July 15, 1948, p. 80-88.

Building up worn surfaces and repairing broken parts at Carnegie-Illinois Steel Corp., Munhall, Pa.

22b-218. A New High-Strength Welding Rod. Lester Tarnopol. *Welding Journal,* v. 27, July 1948, p. 517-521.

Research leading to development of a satisfactory rod for arc weld-

ing of aircraft landing-gear assemblies. Macrostructure and microstructure. Tensile, hardness, and spectrographic analysis charts for Planeweld AWF 144-4130 rod.

22b-219. Maintenance Welding in a Steel Plant. Frank J. Gaydos. *Welding Journal,* v. 27, July 1948, p. 527-530.
Examples of the above at Gary Works, Carnegie-Illinois Steel Corp.

22b-220. Fabricated Diesel Engine Structures. C. B. M. Dale. *Welding Journal,* v. 27, July 1948, p. 531-535.
Redesign of a cast-iron diesel engine with a complete interchange of parts with either castings or welded steel parts.

22b-221. Getting Ready to Weld. H. B. Gilson. *Welding Journal,* v. 27, July 1948, p. 539-541.
Edge-preparation steps such as cleaning the metal edges, making allowances for expansion and contraction, and lining up the adjoining pieces.

22b-222. Heliarc Welding of Stainless Steel Tanks. *Welding Journal,* v. 27, July 1948, p. 564.
Application of the inert-gas shielded-arc welding process.

22b-223. Research on Arc Welded Butt Joints of Mild Steel. Georges Welter. *Welding Journal,* v. 27, July 1948, p. 321s-369s.
An investigation at room and subzero temperatures on: ductility; impact-tensile resistance; and effect of notching using cyclic loads and axial and eccentric loads.

22b-224. State of Stress in Arc Welds Made Under Transverse Restraint. Ernest F. Nippes and Warren F. Savage. *Welding Journal,* v. 27, July 1948, p. 370s-376s.
The conditions of restraint are just below the values which would produce longitudinal cracking in the first-pass weld metal. The state of stress resulting from these conditions of restraint is designated as the threshold of cracking. A number of comparisons are made to indicate the significance of plate thickness, joint geometry, and type of electrode.

22b-225. The Powder Process in Stainless Steel Production. C. J. Burch and E. M. Holub. *Iron and Steel Engineer,* v. 25, July 1948, p. 43-51; discussion, 51-52.
Use of metallic powders for cutting and scarfing a large variety of alloy compositions at any stage from the ingot to the finished product.

22b-226. Resistance Welding in the Steel Industry. O. H. Griffith. *Iron and Steel Engineer,* v. 25, July 1948, p. 58-61; discussion, p. 61.
Various types of equipment and their applications.

22b-227. 24,000 Spot Welds Per Hour. *Machine Design,* v. 20, July 1948, p. 148-149.
Designed to spot weld automatically scooter-wheel halves together, multiple-head welder combines electrical, hydraulic, and pneumatic power and control.

22b-228. Arc Welding Shrinks Prop Hub Cost, Weight. *SAE Journal,* v. 56, July 1948, p. 33-39. Excerpts from **Arc Welded Propeller Hubs Reduce Cost—Weight,** by John D. Waugh.
Redesigning propeller hubs for arc welding instead of forgings saves steel, lowers production costs, and reduces weight. How to design for welding and the production-welding technique for fabricating these hubs.

22b-229. Butt Welded Rail in Australia. *American Railway Engineering Association, Bulletin,* v. 50, June-July 1948, p. 52-56.
Above practice has been applied to nearly 1400 miles of track and is being rapidly extended. Methods are outlined.

22b-230. Welded Locomotive Trucks. F. H. Brehob and W. H. Cochran. *Railway Mechanical Engineer,* v. 122, July 1948, p. 73-74.
Experience with the above; procedures of design and manufacture.

22b-231. Modern Flash Butt Welded Steel Chain Cable. E. Wood. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 133-136; discussion, p. 147-152.

22b-232. Chains. J. G. Hopcraft. *Journal of the Birmingham Metallurgical Society,* v. 28, June 1948, p. 137-141; discussion, p. 147-152.
Small steel-chain manufacture by the slow butt welding process, especially by automatic machines.

22b-233. Some Aspects of Welding in the Heavy Chemical Industry. E. Fuchs and D. A. Godfrey. *Transactions of the Institute of Welding,* v. 11, June 1948, p. 97-108.
A variety of applications in construction and repair of equipment. Limited to ferrous metals.

22b-234. Recommendations for the Design of Arc Welded Mild Steel Machinery Constructions. *Welding Research,* v. 2 (Bound with *Transactions of the Institute of Welding,* v. 11), June 1948, p. 43r-53r.
Committee report.

22b-235. M. W. Kellogg Constructs and Welds Unusual Structure. *Victor Weld,* v. 4, July 1948, p. 11.
Fabrication of two propane decarbonizing towers, each 12 ft. in diameter, 75 ft. in length and 2⅝ in. in wall thickness.

22b-236. Manual Hidden Arc Welding Increases Welding Speeds. Ray Zeh. *Steel Processing,* v. 34, July 1948, p. 358-359.
Use in fabricating parts for steel heat treating furnaces. In some cases welding speeds have been increased by 100%.

22b-237. How Modern Tools and Methods Shorten the Work. *Sheet Metal Worker,* v. 39, July 1948, p. 35-36, 40.
Welding procedures for heavy-gage sheet-metal custom fabrication, and the multiple processing of several home appliances.

22b-238. Fabrication of New Westinghouse Alternating Current Welders. Floyd McKnight. *Modern Industrial Press,* v. 10, July 1948, p. 22, 26, 28, 38.
Welding and forming equipment and procedures.

22b-239. How to Weld Clad Steels. L. W. Williams. *Iron Age,* v. 162, July 22, 1948, p. 72-80; July 29, 1948, p. 82-88.
Step-by-step procedures for welding such cladding alloys as A.I.S.I. 405, 410, 430, 301, 302, 304, 316, 321, 347, nickel, monel, and Inconel. Weld preparation, weld metals, bead sequence, overlays, backup strips, metallurgical and physical factors, stress relief, hot working, and other factors affecting satisfactory welding. Second installment deals with the remaining types of stainless used most generally in cladding. Heat treating, types of joints, welding electrodes, and overlays.

22b-240. Now ACF Welds Hopper Cars Too—At 25 a Day. *American Machinist,* v. 92, July 29, 1948, p. 116-117.

22b-241. Welding Saves Million Dollars a Year at Harbor Steam Plant. Carl N. Barlow. *Power,* v. 92, Aug. 1948, p. 71-73.

22b-242. Welding Stresses Dissipated by Low-Temperature Process. T. W. Greene. *Steel,* v. 123, Aug. 9, 1948, p. 78-82.
Effective and practical method of eliminating high, residual welding stresses, or reducing them to negligible values, without distortion or deformation, is offered by fast, low temperature process. By heating plate on both sides of the weld to 350 to 400° F., correlated with proper cooling, the weld is temporarily strained and actually proof-tested.

22b-243. Repair, by Welding, of a Blade of the Hydro-Turbine of Svirsk Hydro-Electric Station. (In Russian.) A. A. Evdokimov. *Kotloturbostroenie* (Boiler and Turbine Manufacture), Jan.-Feb. 1948, p. 32.
Reports the successful repair of a broken blade of a hydro-turbine weighing about 10 tons and made of 14% chromium steel.

22b-244. Flame Cutting of Ferrous Metals. *Materials & Methods,* v. 28, Aug. 1948, p. 87, 89.
Various methods, and chart on cutting speeds and gas consumption for cutting steel plates.

22b-245. Spot Welding of SKhLF Steel. (In Russian.) A. S. Gel'man and S. S. Astaf'ev. *Avtogennoe Delo* (Welding), April 1948, p. 1-10.
Spot welded specimens of above steel (C, 0.12%; Si, 0.31%; Mn, 0.52%; S, 0.030%; P, 0.10%; Cr, 0.55%; Ni, 0.45%; Cu, 0.68%) were investigated and optimum conditions for welding established. Mechanical properties of the specimens.

22b-246. Coating of Steel Electrodes for Welding Cast Iron. (In Russian.) P. S. Elistratov. *Avtogennoe Delo.* (Welding), April 1948, p. 17-19.
Coatings of different compositions for the above. On the basis of obtained data, the optimum composition was established.

22b-247. Mechanical Properties of Joints Made by Gas Pressure Welding During Construction of Main Pipe Lines. (In Russian.) A. S. Fal'kevich. *Avtogennoe Delo.* (Welding), April 1948, p. 20-22.
Conditions for welding low-carbon-steel pipe made of thin longitudinally welded sheets. Mechanical properties of welded joints.

22b-248. Production of Milling-Machine Tools by Building Up High-Speed Steel by Use of Arc Welding and Specially Coated Electrodes. (In Russian.) Z. M. Ryzhik. *Avtogennoe Delo.* (Welding), April 1948, p. 22-23.
Methods of production, composition of the coatings, and the heat treatment of the finished tools.

22b-249. Influence of Heat Treatment on the Strength of Spot Welds in "Chromansil" Steel. (In Russian.) F. E. Tret'yakov. *Avtogennoe Delo.* (Welding), April 1948, p. 25-26.
Results of investigation.

22b-250. Welding in Steel Plant Maintenance. T. W. McAuley. *Canadian Metals & Metallurgical Industries,* v. 11, Aug. 1948, p. 19-22, 40-42.

Application of arc welding in design, fabrication, construction, and maintenance at Algoma Steel Corp.

22b-251. High-Purity Helium Saves Money on Aluminum Welds. William A. Mays. *Welding Journal,* v. 27, Aug. 1948, p. 609.

In using welding-grade helium in welding aluminum, it has been found that one-fifth to one-third more helium is normally required than when using argon. By using helium, greater penetration is obtained and much faster welding speeds are possible than with argon so that the over-all cost per inch of weld is quite favorable.

22b-252. Spot Welding of Mild Steel in Production. N. E. Wheeler. *Welding Journal,* v. 27, Aug. 1948, p. 613-614.

Design, control, operator training, machine maintenance and inspection.

22b-253. Residual Stresses in a Butt-Welded Structural I-Beam. W. J. Krefeld and E. C. Ingalls. *Welding Journal,* v. 27, Aug. 1948, p. 417s-420s.

Supplementary measurements of residual stresses induced by the welding operation. The order of magnitude of these stresses is of interest in analyzing causes of premature inelastic action found in testing the as-welded beams under both static and dynamic loads. The behavior suggested the existence of relatively high initial stresses.

22b-254. Welding Screw Shafts to Castings. P. H. Setzler. *Iron Age,* v. 162, Aug. 26, 1948, p. 93-94.

Method of producing a combination hot rolled or forged steel shaft and cast steel head in the form of a thermit welded assembly.

22b-255. Welding Beats the Steel Shortage. Walter J. Brooking. *Welding Engineer,* v. 33, Sept. 1948, p. 34-37.

Flexible welded construction made possible the utilization of war-surplus steel shapes, plates, bars, and billets to build the new LeTourneau plant at Longview, Tex.

22b-256. No More Rivets. *Welding Engineer,* v. 33, Sept. 1948, p. 40-41.

New welding techniques being used in hopper-car fabrication.

22b-257. Erie's Floating Dry Dock. George J. Newhams. *Welding Engineer,* v. 33, Sept. 1948, p. 51.

New 400-ton capacity all-welded dry dock.

22b-258. Penstock Practice. O. R. Carpenter. *Welding Engineer,* v. 33, Sept. 1948, p. 56-60, 62.

Use of welding in fabrication of sections of large-diameter steel penstocks.

22b-259. Silver Soldering Spiral Saws. Alexander Maxwell. *Tool & Die Journal,* v. 14, Sept. 1948, p. 60-61.

Recommended procedures. Users of spiral-tooth bandsaw blades are urged to learn how to "weld" their own, in order to increase saw versatility and to achieve savings by purchase of bulk coils of saw blade.

22b-260. Tips on Stainless Clad. Leonard C. Grimshaw. *Industry and Welding,* v. 21, Sept. 1948, p. 70, 72-73, 85-86.

Suggestions for welding.

22b-261. Experience With the Oxygen Arc Method of Cutting Cast Iron Pipe. Sherman L. Rogers. *Water & Sewage Works,* v. 95, Sept. 1948, p. 308-309.

22b-262. Welding Body Sections at Ford. Dempsey Criteser. *Iron Age,* v. 162, Sept. 9, 1948, p. 88-94.

Many of the body sections are handled and welded automatically. The various welding sequences.

22b-263. Furnace-Brazed Assemblies Replace One-Piece Units. H. M. Webber. *American Machinist,* v. 92, Sept. 9, 1948, p. 92-96.

Use for production of miscellaneous steel parts. Numerous units originally forged, cast, or machined from bar stock are now assembled from less expensive punch-press and screw-machine parts and furnace brazed. Other fabricating methods, such as torch brazing, have in some instances been replaced by electric-furnace brazing.

22b-264. Essential Questions Concerning the Welding of Main Pipe Lines. (In Russian.) A. S. Fal'kevich. *Avtogennoe Delo* (Welding), May 1948, p. 3-5.

Main factors to be considered. Different welding processes were investigated. Most suitable methods and conditions.

22b-265. Argon-Arc Welding of Thin Stainless Steel Sheets. (In Russian.) A. Ya. Brodskii. *Avtogennoe Delo* (Welding), May 1948, p. 6-8.

A new method which because of its high efficiency, absence of the necessity for using fluxes, and high strength and corrosion resistance of the welds, is very suitable for the sheets 1 to 1.5 mm. in thickness.

22b-266. Automatic Welding of Pins to Vertical and Overhead Surfaces. (In Russian.) N. G. Ostapenko. *Avtogennoe Delo* (Welding), May 1948, p. 16-18.

Apparatus and technique.

22b-267. Une technique particuliere d'assemblage bout a bout des tuyauteries de vapeur. (A Special Technique for Joining Steam Pipes by Welding.)

H. Berbeaux. *Soudure et Techniques Connexes,* v. 2, May-June 1948, p. 92-97.

Oxyacetylene welding for small-diameter tubes and butt welding for large ones. Optimum conditions, including welding-rod compositions.

22b-268. Evolution de la conception et de l'exécution des ponts et charpentes soudés en Belgique. (Evolution in Design and Construction Methods for Welded Bridges and Structures in Belgium.) H. Louis. *Soudure et Techniques Connexes,* v. 2, May-June 1948, p. 98-110.

Because of numerous failures of welded structures during the past decade, a great deal of research has been done, resulting in extensive changes in design of structures.

22b-269. The Weldability of High Tensile Alloy Steels, and a New Weld Cracking Test. P. L. J. Leder. *Engineers' Digest,* v. 5, July 1948, p. 246-250.

Previously abstracted from a paper of *The Institution of Mechanical Engineers,* May, 1948, 20 pages. Item 22b-214, 1948.

22b-270. Welded Rail Joints Cut Track Maintenance Costs. *Mechanization,* v. 12, Aug. 1948, p. 116, 119.

Experiences of Gauley Mountain Coal Co.

22b-271. Designing for Welding. J. Mikulak. *Machine Design,* v. 20, Sept. 1948, p. 147-152.

Previously abstracted from *Welding Journal,* v. 27, April 1948, p. 290-298. See item 22b-149, 1948.

22b-272. Notes on the Transition from Riveted to Welded Designs. G. Murray Boyd. *Transactions of the Institute of Welding,* v. 11, Aug. 1948, p. 148-151; discussion, p. 151-155.

Historical progress of structural engineering and the changes which took place upon development of new materials and processes. Basic principles together with notes on internal stresses and brittleness.

22b-273. Present Position on Residual Stresses in Welded Structures. R. Weck. *Transactions of the Institute of Welding,* v. 11, Aug. 1948, p. 142-147.

Types of failures are those occurring during or shortly after welding; suddenly in service; and under the influence of corrosive media. 29 ref.

22b-274. Welding Applied to Dredge Construction. D. W. Low. *Transactions of the Institute of Welding,* v. 11, Aug. 1948, p. 134-141.

22b-275. Mechanical Properties and Welding Characteristics of Single Projections in Low Carbon Mild Steel Sheet With Particular Reference to the 14 S.W.G. Thickness. A. J. Hipperson. *Welding Research,* v. 2 (Bound with *Transactions of the Institute of Welding,* v. 11), Aug. 1948, p. 69r-80r.

First part of an investigation dealing with the process of projection welding, under the guidance of the FR. 3 Committee of the British Welding Research Assoc. The work included a study of the effects of short-circuit secondary current, duration of welding current, and applied pressure.

22b-276. Welding Jig Guarantees Accurate Cabinet Making. *Sheet Metal Worker,* v. 39, Sept. 1948, p. 44.

22b-277. Strain Aging in Welding Low-Carbon Structural Steel. W. H. Bruckner and W. E. Ellis. *Welding Journal,* v. 27, Sept. 1948, p. 441s-447s.

Tests were made on ½-in. rolled plates of A.S.T.M. A 7 steel welded with E6010 electrodes. Strain aging tests were made with taper-drawn, work-brittleness bars of plate and weld deposit drawn through a strain gradient of 0 to 10%. Hardness tests were made to follow changes with time and temperature for definite strain levels. Charpy V-notch impact tests were made over a temperature range to determine notch sensitivity and transition temperatures of the base plate and weld deposit in the original condition, strain aged, and in the thermally stress-relieved condition. Susceptibility to strain aging was slight under the conditions described.

22b-278. Shrinkage Stresses in Spot-Welded Joints. Viktor Hauk. *Welding Journal,* v. 27, Sept. 1948, p. 453s-456s. Translated from a report from the Institute for Materials Research of the German Aircraft Experimental Laboratory.

Stresses were determined in 0.102-in. manganese steel. Disks were produced initially free from stress. The spot welds were made in a tube-controlled, Siemens spot welding machine with 0.8-sec. welding time. The back-reflection X-ray method was used to determine radial and tangential shrinkage stresses. Agreement between experimental results and theoretical calculations was relatively good. 24 ref.

22b-279. New Factors to be Considered in the Design and Welding of Ships. Milton Forman. *Welding Journal,* v. 27, Sept. 1948, p. 671-678.

Results of investigations of the past few years. 21 ref.

22b-280. Resistance Welding Crossed Wires. Raymond C. Jones. *Welding Journal,* v. 27, Sept. 1948, p. 703-714.

Results of a study of the effect of welding variables, namely electrode force, time, and current, on the strength and appearance of crossed-wire welds in cold drawn and hot drawn low-carbon steel wires ⅛ to ½ in. diameter. Each wire was studied under the three conditions of setdown of 15, 30 and 50%. Jig developed for use in conjunction with a standard testing machine for breaking welded coupons.

22b-281. **Welding Spiral Flights with Automatic Tractor Inside 4-Ft. Diam. Kiln.** J. W. Hill. *Welding Journal,* v. 27, Sept. 1948, p. 723-724.

Equipment and procedures.

22b-282. **How to Make Them Last; Increase Life of Farm Equipment Parts by Hard-Facing.** J. E. Dato. *Welding Journal,* v. 27, Sept. 1948, p. 726-727.

22b-283. **The Road Bridge to the Rupperswil-Auenstein Hydroelectric Plant in Switzerland.** A. Lumbotte. *Welding Journal,* v. 27, Sept. 1948, p. 729-730. Translated from *Ossature Métallique,* v. 13, March 1948, p. 126-128.

Over-all structure and welding details of bridge.

22b-284. **The Impact Strength of Single Bead Arc Weld Deposits as Affected by Temperature.** R. Eisenberg and R. J. Raudebaugh. *Welding Journal,* v. 27, Sept. 1948, p. 433s-435s.

Results of impact tests made on single-bead welds in S.A.E. 1020 hot rolled steel from 6012 and 6020 rods from −100 to 1800° F., in an attempt to compare the brittle temperature of the single-bead welds with multibead welds, and to justify any variation in data. No great differences were found except in the low-temperature area.

22b-285. **The Comparative Behavior of Mild Steel Welds Made with E6010 and E6016 Electrodes.** F. S. Gardner, F. W. Daniels, and R. M. Rood. *Welding Journal,* v. 27, Sept. 1948, p. 436s-440s.

The work was primarily directed toward obtaining data of a fundamental type as an aid in the better understanding of hydrogen in arc welds.

22b-286. **Welding Banjo Type Axles at Ford.** Walter Kroy. *Iron Age,* v. 162, Sept. 23, 1948, p. 96-101.

Automatic process which utilizes automatic butt welding, spot welding, arc welding, and projection welding.

22b-287. **Investigation of the Crystal Structure of the Seam Metal in Arc Welding.** (In Russian.) A. A. Alov and I. M. Vagapov. *Avtogennoe Delo* (Welding), June 1948, p. 10-15.

The role of electrodes and their coatings is emphasized. On the basis of obtained data, the hypothesis of Medovar and Makar concerning the periodicity of welded-seam crystallization could not be verified.

22b-288. **Influence of Surface Oxides on the Formation of Pores During Welding Under Flux.** (In Russian.) K. V. Lyubavskii. *Avtogennoe Delo* (Welding), June 1948, p. 15-20.

Study resulted in the conclusion that the main factor in pore formation is the composition and the viscosity of the fluxes used. Increased concentration of manganous oxide in the flux considerably decreases the tendency of welded surfaces to oxidation, thus decreasing pore formation.

22b-289. **Deformation of Welded Joints During Automatic Welding Under Flux.** (In Russian.) V. M. Rybakov. *Avtogennoe Delo* (Welding), June 1948, p. 20-24.

Results of experimental investigation of above, particularly for butt and lap welding of three types of steel.

22b-290. **Some Cases of Failure of Welded Tanks at Low Temperatures.** (In Russian.) V. I. Shabalin. *Avtogennoe Delo* (Welding), June 1948, p. 29-30.

22b-291. **Transverse Shrinkage of Butt Welds During Arc Welding of Thick Steel Plates.** (In Russian.) V. L. Tsegelskii and V. I. Mel'nik. *Avtogennoe Delo* (Welding), June 1948, p. 31-32.

Recommended cross sections and sequences for deposition of weld metal. An empirical formula for calculation of the expected shrinkage.

22b-292. **Motor Car Production. I. Austin Methods and Equipment.** *Welding,* v. 16, Sept. 1948, p. 368-380.

Assembly methods in production of above British car, especially welding.

22b-293. **A Welded Steam Turbine Exhaust Casing.** W. J. Livesey. *Welding,* v. 16, Sept. 1948, p. 381-389, 408.

Design and manufacture of a welded steam-exhaust casing and advantages as compared with the former cast-iron type.

22b-294. **Aids for Hardfacing; Selection of Equipment and Jigs.** M. Riddihough. *Welding,* v. 16, Sept. 1948, p. 390-397.

Some important aspects of hard facing technique including temperature control, special fixtures, and automatic methods of deposition. The information is from a book entitled "Hardfacing by Welding" which will be published shortly.

22b-295. Welded Buildings in the U. S. A.; Examples of Recent Development. *Welding,* v. 16, Sept. 1948, p. 398-400, 408.

22b-296. High-Speed Production of Cycle Frames; Use of Special Butt Welder. *Welding,* v. 16, Sept. 1948, p. 401-403.

22b-297. Stag Athyweld Tools. *Machinery (London),* v. 73, Sept. 23, 1948, p. 473-475.

Use of atomic-hydrogen welding in manufacture of cutting tools by application of high-speed-steel cutting edges.

22b-298. Properties of Copper Brazed Joints. G. B. Wilkes, Jr. *Iron Age,* v. 162, Sept. 30, 1948, p. 44-51.

Results of experiments on joint clearance, shear strength, elevated temperature strength, heat treating, and other factors made on brazed assemblies using an N.E. steel, two S.A.E. carbon, and four S.A.E. alloy steels.

22b-299. Full Automatic Bloom Scarfer at J & L. *Iron Age,* v. 162, Sept. 30, 1948, p. 59.

22b-300. Power Shovel Performance Improved by Welded Construction. Lee Judge. *G. E. Welding Arcs,* v. 14, Oct. 1948, p. 6.

22b-301. Arc Welding Promotes Playboy Pilot Production. *G. E. Welding Arcs,* v. 14, Oct. 1948, p. 7-9.

Picture story shows production of new automobile.

22b-302. Stove Production Facilities Increased by Expanding Use of Resistance Welding. *Stove Builder,* v. 13, Oct. 1948, p. 48-59.

Facts obtained during a survey of the range and heater industry.

22b-303. Points to Remember When You Bronze-Weld. *Linde Tips,* v. 27, Oct. 1948, p. 80.

Techniques.

22b-304. Bridge Fails; Welds Don't. *Welding Engineer,* v. 33, Oct. 1948, p. 54-55.

Disastrous collapse of Minnesota coal-handling bridge which shows comparative strength of riveted and welded structural members.

22b-305. Welded Cranes and Monorails. Walter J. Brooking. *Welding Engineer,* v. 33, Oct. 1948, p. 58-59.

Design and installation in LeTourneau's Longview, Texas, plant.

22b-306. The Welds Held. E. D'Acre Lacy. *Welding Engineer,* v. 33, Oct. 1948, p. 64-66.

Her port bow stove in by collision, the welded ship "American Farmer" was towed to a British dockyard. New deck and side plating were added to fill a gap measuring 34 x 26 ft.

22b-307. Furnace Brazing Simplifies Product Design. H. M. Webber. *Steel,* v. 123, Oct. 4, 1948, p. 79-84, 114.

Typical applications, also methods and equipment. Examples from a number of plants are dealt with.

22b-308. Effect of Welding Practice on Abrasion Resistance of Hard Facings. Roy D. Haworth. *Iron Age,* v. 162, Oct. 7, 1948, p. 82-87.

Gas deposition of hard facing material frequently gives better sliding wear resistance than arc deposits, even in thinner coatings, investigations at Armour Research Foundation have revealed. Details of the tests, which embraced both gas and electric arc deposits, and an interpretation of the results. Suggestions on adjustment of arc deposits to give better abrasive resistance and a description of a new abrasion-testing machine.

22b-309. Hard Surfacing by Fusion Welding. Howard S. Avery. *Steel,* v. 123, Oct. 11, 1948, p. 96-100, 107, 110, 112.

Need for armoring parts against severe service requiring wear, corrosion, or heat resistance—or perhaps all three—can be met by depositing a hard surface overlay 1/32 to 3/8-in. thick. Materials for this purpose are available in the form of carbides, nitrides, borides, composite metals, cobalt, and nickel and iron-base alloys.

22b-310. Built-Up Forged Tools. (In Russian.) V. A. Lapidus. *Stanki i Instrument* (Tools and Instruments), v. 19, June 1948, p. 14-16.

Cast and forged built-up tools (hard metal deposited by welding). Despite a similar amount and size of carbide inclusions, the former are more brittle. Causes are indicated. A new method of manufacture is proposed.

22b-311. New Type of Electrode Coating for Welding Low-Carbon Steel. A. A. Alov. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 356. Translated and condensed from *Avtogennoe Delo* (Welding), Sept. 1947, p. 8-11.

Previously abstracted from original source. See item 22-795, 1947.

22b-312. Automatic Welding Cuts Assembly Cost. *Production Engineering & Management,* v. 22, Oct. 1948, p. 73.

Setup for production of large-size conveyer links.

22b-313. The New Nylon Factory; Use of Heavy Columns of Welded Steel. Guthlac Wilson and W. A. Mitchell.

Welding, v. 16, Oct. 1948, p. 415-418, 446.

Steelwork of new British factory.

22b-314. Some Modern Developments in Steels for Welded Structures. W. Barr. *Welding,* v. 16, Oct. 1948, p. 419-427.

Development of alloy steels and their weldability. Weld hardening and the mechanism of brittle fracture. Weld sections on which hardness gradients are indicated.

22b-315. Trend of Boiler Welding Repairs; Advances in Technique. J. K. Johannesen. *Welding,* v. 16, Oct. 1948, p. 433-435.

22b-316. General Welding Practices in Locomotive and Car Shops. J. Michne. *Welding Journal,* v. 27, Oct. 1948, p. 781-784.

Practical recommendations.

22b-317. Arc-Welded Steel Framing Reduces Cost of Residential Building. A. F. Davis. *Welding Journal,* v. 27, Oct. 1948, p. 788.

22b-318. Submerged Arc Welding of Freight Cars. E. A. Watson. *Welding Journal,* v. 27, Oct. 1948, p. 789-793.

22b-319. What a Maintenance Department Can Do With Cutting and Welding in a Paper Mill. Jamison Moore. *Welding Journal,* v. 27, Oct. 1948, p. 793-795.

22b-320. Stud Welding Saves Time. *Welding Journal,* v. 27, Oct. 1948, p. 811.

Use to hold wire mesh reinforcing.

22b-321. Welded Bridges. LaMotte Grover. *Welding Journal,* v. 27, Oct. 1948, p. 812-826.

Welded bridges constructed in the U. S., Canada, and various foreign countries during the last 12 years; various practices in specifying steel materials; details of design; and methods of construction; results of some German fatigue tests of welded beams, and of some fatigue fractures in girders and stringers of riveted railway bridges; and repairs made by welding. 17 ref.

22b-322. Welded Stamped Grid Resisters. W. J. Kutcher and A. L. Ward. *Welding Journal,* v. 27, Oct. 1948, p. 827-830.

Design of a new resister made from a high-resistance alloy and the method of welding used in its construction. The alloy contains 12 to 14% Cr, 4 to 5% Al, 0.12% C, and balance Fe.

22b-323. Tapered Bore of Two-ton Rebuilt by Union-Melt Process. *Welding Journal,* v. 27, Oct. 1948, p. 856.

Bore of a forging-hammer ram.

22b-324. Effect of Weld Metal Composition on the Strength and Ductility of 15% Cr, 35% Ni Welds. David Rozel, Hallock C. Campbell, and R. David Thomas, Jr. *Welding Journal,* v. 27, Oct. 1948, p. 481s-491s.

Optimum composition limits for C, Si, Mn, S, and P were established, based on room temperature all-weld-metal tensile tests. The introduction of columbium into the weld metal improves soundness, but since it also decreases ductility, it is considered undesirable.

22b-325. Furnace Brazing with Pressed Metal Parts. Parts I and II. H. M. Webber. *Steel Processing,* v. 34. Sept. 1948, p. 469-474; Oct. 1948, p. 1948, p. 554-556.

Previously abstracted from *Steel,* v. 123, Oct. 4, 1948, p. 79-84, 114; see item 22b-307.

22b-326. Comparison of Cements for Bonding Nitrile Rubber to Steel. Ross E. Morris, Joseph W. Hollister, and Paul A. Mallard. *Rubber Age,* v. 64, Oct. 1948, p. 53-56, 96.

Quantitative comparative data on chlorinated rubber vs. phenolic resin.

22b-327. Carbon Blocks Simplify Welding Jobs. Phil Glanzer. *American Machinist,* v. 92, Oct. 21, 1948, p. 124-125.

How machining time on welded repairs can be substantially reduced by using carbon plates, blocks, and rods to fix the shape of the weld.

22b-328. Welding Conserves Steel. T. R. Mullen. *Engineering News-Record,* v. 141, Oct. 28, 1948, p. 104-105.

Examples show such conservation in the building of large structures.

22b-329. Welding Stainless Containers by Inert-Gas Shielded Arc Process. *Steel,* v. 123, Nov. 1, 1948, p. 82-83.

Methods and equipment.

22b-330. A Portable Rig for Oil Wells. Henry W. Young. *Welding Engineer,* v. 33, Nov. 1948, p. 33-35.

Welded fabrication.

22b-331. RECO Makes Tanks. Gerald Eldridge Stedman. *Welding Engineer,* v. 33, Nov. 1948, p. 36-39.

Fabrication of a variety of pressure vessels.

22b-332. Truck Cabs Welded on the Assembly Line. Fred M. Burt. *Welding Engineer,* v. 33, Nov. 1948, p. 40-43.

Use of arc, gas, and spot welding for assembly of truck and passenger-car bodies.

22b-333. Mechanized Tube Brazing. Phil Glanzer. *Welding Engineer,* v. 33, Nov. 1948, p. 44-45.

Novel setup for oxy-acetylene brazing which speeds production of

tubular rings for bar-stool footrests. The brazing ring is held in place by a steel "aligner".

22b-334. Screens, Doors and Hoops. Walter Rudolph. *Welding Engineer,* v. 33, Nov. 1948, p. 52-53.

Use of various resistance welding processes to make such diversified products as frames for doors and windows and steel barrel hoops.

22b-335. Welded Scows for Alaska. Margaret Ralston. *Welding Engineer,* v. 33, Nov. 1948, p. 54-55.

Novel fabrication method. The boats are built in quarters and later assembled on the water front.

22b-336. Automatic Welding on the Beam. W. S. Stewart. *Industry and Welding,* v. 21, Nov. 1948, p. 81-84.

Production of steel beams from flat plates by welding. This is done on a custom basis, for those who are unable to secure the desired shapes from the rolling mills.

22b-337. Welding Hudson's "Monobilt" Body-and-Frame. Charles H. Wick. *Machinery,* v. 55, Nov. 1948, p. 170-177.

Use of automatic, multiple-transformer resistance-welding machines and portable welders suspended above unique "Merry-Go-Round" conveyers in making approximately 5300 spot welds per car.

22b-338. Resin Bonding of Silicon Steels in Electrical Laminated Cores. S. B. Ashkinazy and J. J. Preisler. *Product Engineering,* v. 19, Nov. 1948, p. 85-89.

Problems encountered in the development of a satisfactory method for bonding silicon-steel laminations with a thermoplastic-resin adhesive. Electrical considerations underlying magnetic-core design. Effects of different annealing treatments on surface condition and magnetic properties of silicon steels.

22b-339. Welded Pipelines. Rolt Hammond. *Petroleum,* v. 11, Nov. 1948, p. 245-249.

Construction techniques used by Anglo-Iranian Oil Co. and other companies throughout the world.

22b-340. Flash Welding Speeds Output of Endless Steel Bands. *Steel,* v. 123, Nov. 15, 1948, p. 131.

22b-341. Static Strength of Spot-Welded Joints. (In Russian.) A. S. Gel'man and I. A. Bakh. *Avtogennoe Delo* (Welding), Aug. 1948, p. 6-11.

The influence of different factors, such as thickness of joined plates, distribution of spot-welds, welding conditions for a low-carbon steel.

22b-342. Method of Investigation of Technological Properties of Electrodes. (In Russian.) A. A. Erokhim. *Avtogennoe Delo* (Welding), Aug. 1948, p. 12-16.

Most important factors in arc welding are the ionization ability of electrodes, the process of electrode fusion, and formation of the welded seam. Methods for investigation. Theoretical bases and practical application of these methods. Deals only with welding of steel.

22b-343. "Mark MEZ-01" Electrodes. (In Russian.) N. N. Kryukovskii. *Avtogennoe Delo* (Welding), Aug. 1948, p. 16-17.

Properties of welds in steel made with above electrode. Composition of the electrodes and their coatings.

22b-344. Welded Structures. Steel Buildings, Trusses, Joists, Bridges, Floor Spans, Tanks. R. G. Alison. *Canadian Metals and Metallurgical Industries,* v. 11, Oct. 1948, p. 33, 38, 45.

Design factors and advantages of welding.

22b-345. Hardfacing Techniques; Comparison of Modern Methods. M. Riddihough. *Welding,* v. 16, Oct. 1948, p. 428-432.

Based on information forming part of a section of a book entitled "Hardfacing by Welding", to be published shortly. (To be concluded).

22b-346. Re-Engineered Welding Techniques Increase Man-Hour Output of Parts. E. A. Bussard. *Production Engineering & Management,* v. 22, Nov. 1948, p. 56-58.

How it was accomplished in the fabrication of miscellaneous parts for furnaces, heaters and stoves.

22b-347. Production Processes—Their Influence on Design. Part XXXVIII. Spot Welding. Roger W. Bolz. *Machine Design,* v. 20, Nov. 1948, p. 127-135.

Various types of welding and welding equipment, their applicabilities, and principles of design for most efficient use of welding.

22b-348. Welding in Engineering Production. J. R. Ferguson. *Transactions of the Institute of Welding,* v. 11, Oct. 1948, p. 170-176; discussion, p. 177-180. A condensation.

Work ranging from one to 15 tons weight as well as examples of light work under 1000 lbs. Resistance, projection, and stud welding.

22b-349. Lessons From Structural Failures of Welded Ships. *Transactions of the Institute of Welding,* v. 11, Oct. 1948, p. 181-188.

Transcript of discussion at a meeting of the North-East (Tyne-Side) Branch of the Institute of Welding, Newcastle, England, Jan. 15, 1948.

22b-350. Recommended Practice for the Spot Welding of Low Carbon Mild Steel Sheet. *Welding Research,* v. 2. (Bound with *Transactions of the Institute of Welding,* v. 11), Oct. 1948, p. 83r-86r.

22b-351. Automatic Arc-Welding Alloy Steel Plates. Howard L. Miller. *Welding Journal,* v. 27, Nov. 1948, p. 916-920.

Development of high-strength weldable alloy-steel plate. Unrestrained welding conditions, low-hydrogen type flux, and small deposits are helpful in borderline cases. Ferrite-forming alloys are preferable to the carbide-forming alloys.

22b-352. Welding the Modern Diesel Locomotive. H. S. Swan. *Welding Journal,* v. 27, Nov. 1948, p. 929-935.

22b-353. Structural I-Beam Cutoff Machine. George J. Strate. *Welding Journal,* v. 27, Nov. 1948, p. 936-941.

The above is an unusual oxyacetylene machine designed to cut I- or H-beams from 10 to 36 in. on a steel-mill roll line. The unit produces a cut surface comparable to a cold saw.

22b-354. Production Heli-Welding Stainless Steel. Bernard Blickman and Newton Blickman. *Welding Journal,* v. 27, Nov. 1948, p. 945-950.

When to use inert-gas welding, manual or automatic welding; type of electrode.

22b-355. Eccentric Guides Welding Head to Make Small Circular Welds. *Welding Journal,* v. 27, Nov. 1948, p. 950.

22b-356. Backups for Grooved Weld Joints. Chester R. Austin and P. J. Rieppel. *Welding Journal,* v. 27, Nov. 1948, p. 555s-567s.

Tests of commercial refractories for backups of root welds in single-vee and double-vee butt joints in structural steel showed that none of these materials were entirely satisfactory. Improvements were obtained in a few cases by covering the refractories with a wash coating of wollastonite. Refractory cements, ramming mixes, refractory ceramic materials, and miscellaneous foundry materials were generally unsatisfactory. A large number of granular ceramic materials and mixtures were tried. Compositions of the most promising materials and properties of the welds obtained when using them.

22b-357. Welded Boilers and Alloy Steels. *Railway Mechanical Engineer,* v. 122, Nov. 1948, p. 110-113.

Locomotive builders and steel manufacturers present data on weldability and properties of alloy steels for use in welded locomotive boilers. Includes introduction and the following brief articles: Alloy Steels for Welded Boilers, Robert L. Heath, Steels and Their Edge Preparation, A. J. Raymo, Welding Tests of Nickel Steel, J. W. Crossett, Manganese-Vanadium Steel, T. W. Merrill, and Welding Stainless Steels, H. L. Miller.

22b-358. Soldering Plated Articles. *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 708-710.

Recent British patent on a chemical-treatment method for application to sheet steel before electroplating. Soldered joints in such tin plate are ordinarily not as strong as those in hot-dipped plate, but use of the treatment described—anodic cleaning with H_2SO_4 and dipping in hot 5% Na_2CO_3—5% NaOH solution for 1 to 30 sec.—gives excellent results.

22b-359. Welding Aircraft Storage Containers. R. K. Kewley. *Iron Age,* v. 162, Nov. 18, 1948, p. 102-105.

Production methods and equipment for building airtight containers for storing Navy aircraft in fly-away condition.

22b-360. Controlled Welding and Heating. Arthur Q. Smith. *Steel,* v. 123, Nov. 22, 1948, p. 100, 103-104.

Use in fabrication of hollow steel aircraft propellers.

22b-361. Focus on Spain; A Review of Welding Achievements. Jose Martinex Paris and L. A. Lidstone. *Welding,* v. 16, Nov. 1948, p. 460-472.

Important welded structures and the general development of welding in Spain.

22b-362. Grain Drying Equipment; An Unusual Application of Bailey Bridge Units. R. J. Fowler. *Welding,* v. 16, Nov. 1948, p. 473-476.

Application of welding to construction.

22b-363. Hardfacing Technique; Comparison of Modern Methods. M. Riddihough. *Welding,* v. 16, Nov. 1948, p. 477-480.

Second part of a digest of a book entitled "Hardfacing by Welding".

22b-364. Flash Welding Nickel Steels. J. J. Riley. *Welding Engineer,* v. 33, Dec. 1948, p. 36-39.

Experiments in which a group of steels of Ni content varying from 0.10 to 9.0% were flash welded. All were welded without much difficulty, once proper schedules had been established. Welding schedules and physical properties of the welds.

22b-365. Unusual Jobs Done Daily. Fred M. Burt. *Welding Engineer,* v. 33, Dec. 1948, p. 40-43.

Procedures and equipment used in fabrication of oil-field machinery and supplies. One of the unusual setups is one in which high-tensile alloy steel is welded on a production basis while within an electric furnace.

22b-366. Steel Stack for Glass Plant. Gordon Galloway. *Welding Engineer,* v. 33, Dec. 1948, p. 52-53.

Erection of 175-ft. welded steel stack for 150-ton glass furnace.

22b-367. Arc Welded Ark Royal. E. D'Acre Lacy. *Welding Engineer,* v. 33, Dec. 1948, p. 56-58.

Original Ark Royal, a famed British aircraft carrier, was sunk during the war. Her successor, who retains the same name, is an 80% welded ship. Design and construction.

22b-368. In This Corner—Silver Brazing. S. Griswold Flagg. *Industry and Welding,* v. 21, Dec. 1948, p. 40-42.

Use of silver brazing and threadless fittings on 13 miles of refrigeration piping under new floor of Madison Square Garden.

22b-369. Vanstone Joints for Stainless Piping Systems. *Iron Age,* v. 162, Dec. 9, 1948, p. 110.

Joint-forming machine which eliminates necessity for welding and provides easily dissembled systems for the chemicals, food processing, and other industries.

22b-370. Dimensional Changes in Steel —Effect of Welding and Local Heating on Residual Stress. Leon C. Bibber. *Welding Journal,* v. 27, Dec. 1948, p. 1009-1024.

Changes which occur on repeated heating and cooling and the reasons for irreversible changes in shapes and dimensions. Differential cooling tends to transform a cubical block of steel into a sphere, if repeated a sufficient number of times. Practical effects of welding and local heating were studied for structural members and plates. Method used to obtain quantitative data relative to the combined effect of weld metal and base metal.

22b-371. Weldability of Cast Low-Alloy Steels. V. T. Malcolm and S. Low. *Welding Journal,* v. 27, Dec. 1948, p. 1029-1033.

Physical properties and weldability of some of the newer cast low-alloy steels for high-temperature service.

22b-372. Diesel Locomotive Maintenance Welding. R. L. Rex. *Welding Journal,* v. 27, Dec. 1948, p. 1034-1042.

22b-373. Fabrication of Shipping Containers. G. J. Green and D. H. Marlin. *Welding Journal,* v. 27, Dec. 1948, p. 1043-1048.

Design, fabrication procedure, and arc and resistance welding techniques for the production of a durable, weathertight 277-cu. ft. container.

22b-374. ABC's of Straight-Line Cutting. J. Villoresi. *Welding Journal,* v. 27, Dec. 1948, p. 1051-1052.

22b-375. All-Welded Engineering Building. R. H. Davies. *Welding Journal,* v. 27, Dec. 1948, p. 1052-1053.

22b-376. Back on the Job Because They Were Braze Welded. H. B. Gilson. *Welding Journal,* v. 27, Dec. 1948, p. 1054-1055.

Some typical braze-welded repair jobs.

22b-377. Arc Welding of Cast Iron With Nickel Electrodes. T. E. Kihlgren and L. C. Minard. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 357-366; discussion, p. 366-367.

Previously abstracted from preprint. See item 22b-74, 1948.

22c—Nonferrous

22c-1. Controlled Techniques Developed to Flash Weld Copper Coils. *Steel,* v. 122, Jan. 12, 1948, p. 66-67.

Equipment and methods used in manufacture of the 2300-ton magnet structure of Columbia University's cyclotron; 1200 perfect copper welds were completed in one phase of the program.

22c-2. Coils for Atom Smashers. I. A. Oehler. *Welding Engineer,* v. 33, Feb. 1948, p. 56-58.

Use of flashbutt welding to join heavy-section aluminum and copper strips into continuous coil windings for giant cyclotron magnets at American Welding & Manufacturing Co.

22c-3. Storage Battery Work. L. S. Bowser. *Welding Journal,* v. 27, Jan. 1948, p. 36-37.

Welding methods used in making new batteries and repairing old ones.

22c-4. The Welding of Nonferrous Metals—Part IX. The Welding of Nickel and its Alloys. (Concluded.) E. G. West. *Sheet Metal Industries,* v. 25, Jan. 1948, p. 147-154.

22c-5. Welding of Copper and Copper Alloys. Maurice Cook and Edwin Davis. *Transactions of the Institute of Welding.* v. 10, Dec. 1947, p. 178-192; discussion, p. 193.

Welding techniques and procedures for metal-arc, carbon-arc, and gas welding. 20 ref. (Presented at joint meeting of Institute of Metals and Institute of Welding, London, April 30, 1947.)

22c-6. Silicon Bronze Welding Problems Overcome Through Inert-Arc Method. Peter J. Gurklis. *Materials & Methods,* v. 27, Feb. 1948, p. 66-69.

Presence of humid atmosphere has been a source of excessive porosity when using the carbon-arc method. The welding of a bronze containing 96% Cu, 3% Si, and 1% Mn was investigated using carbon-arc; shielded metallic-arc; and inert-gas shielded-arc welding—the latter with helium, argon, and nitrogen. The welds were radiographed and tested mechanically.

22c-7. Arc Welding Copper Vessels. J. J. Vreeland. *Welding Journal,* v. 27, Feb. 1948, p. 125-129.

Carbon-arc method. Illustrations indicate that deoxidized copper can be satisfactorily arc welded. (Presented at 28th Annual Meeting, A.W.S. Chicago, week of Oct. 19, 1947.)

22c-8. Production Methods of Low-Temperature Silver Alloy Brazing. A. M. Setapen. *Welding Journal,* v. 27, Feb. 1948, p. 136-139.

Various applications. Discussion of heating methods. (Paper presented before 47th Annual Convention of the International Acetylene Assoc., Cincinnati, May 20-21, 1947.

22c-9. Hard Soldering of Thin Brass Sheets Using a Spot Welding Machine. (In Russian.) A. S. Rudakov and V. M. Shakhmatov. *Avtogennoe Delo* (Welding), Dec. 1947, p. 24-27.

Method for adaptation of the equipment to this job.

22c-10. The Welding of Nonferrous Metals—Part X. The Welding of Lead and Its Alloys. E. G. West. *Sheet Metal Industries,* v. 25, March 1948, p. 563-573.

22c-11. Limb-Lopper Assembled by Induction. *Western Machinery and Steel World,* v. 39, March 1948, p. 90-92.

The "Limb-Lopper" is an air-actuated pruning tool made in Los Angeles by Miller-Robinson Co. by brazing assembly of simple parts.

22c-12. The Welding of Nonferrous Metals—Part XI. The Welding of Zinc and Its Alloys. (Continued.) E. G. West. *Sheet Metal Industries,* v. 25, April 1948, p. 777-781, 784.

22 references.

22c-13. Arc Welding Red Brass. Louis P. Benua. *Iron Age,* v. 161, June 17, 1948, p. 77-79.

Certain difficulties arose from the fact that components oxidize at high temperatures. By using automatic helium-shielded carbon-arc welding, rejections were reduced 75% and the burst strength of the tank was doubled.

22c-14. The Cold Welding of Metals. *Engineering,* v. 165, June 4, 1948, p. 535.

Not only aluminum and Al alloys, but also various other metals, can be joined at room temperature by applying pressure by means of specially designed dies, provided the metal is given a suitable preliminary surface treatment. Best joints are obtained with Al and its alloys and with Cu. Dissimilar-metal joints of Al and Cu have also been made.

22c-15. Cold Welding. *Engineer,* v. 185, June 4, 1948, p. 541-542.

See abstract from *Engineering,* v. 165, June 4, 1948, item 22c-14.

22c-16. Copper Tanks Welded by Inert Arc. S. V. Jewell. *Welding Engineer,* v. 33, July 1948, p.33-37.

Fabrication of four large copper tanks believed to be the first instance of application of the inert-arc process to large vessels of nearly pure copper. Among the problems encountered and solved were those imposed by space limitations, dirty surroundings, and high humidity.

22c-17. Copper-Aluminum Joints and Combination Materials Made by Upset Welding. R. T. Gillette. *Materials & Methods,* v. 28, July 1948, p. 70-73.

Specially designed equipment and technique. Applications.

22c-18. Welding Conductors to Commutator Decreases Danger of Motor Damage Caused by Overheat. *Steel,* v. 123, July 26, 1948, p. 94.

Method which eliminates the melting and displacing of solder used to connect wire conductors to the armature that sometimes results from overheating due to overload.

22c-19. Silver-Brazed Silverware. Fred M. Burt. *Welding Engineer,* v. 33, Aug. 1948, p. 50-52.

Procedures in producing sterling silver art objects.

22c-20. This Manufacturer Has Developed Some Interesting Carbon Arc and Silver Brazing Procedures on Brass and Copper. T. R. Boswell and W. H. Govier. *Industry and Welding,* v. 21, Aug. 1948, p. 26-29, 48.

22c-21. Attaching Materials to Die Castings With Adhesives. Fred J. Wehmer. *Die Castings,* v. 6, Sept. 1948, p. 46-49, 70-71.

Recommended procedures for rubber, leather, paper, fabric, metal, and glass.

22c-22. Spot-Welding Schedules for Nickel and Nickel Alloys. Frank G. Harkins. *Welding Journal,* v. 27, Sept. 1948, p. 695-702.

Development of spot welding schedules for nickel and nickel alloys. Experiments in welding material of 0.005-in. thickness. Material preparation and chemical cleaning procedures. Schedules for welding dissimilar metal thicknesses. Various methods of achieving "heat balance" to insure proper nugget location. The importance of electrode size and composition, pressure time, current, and mechanical considerations.

22c-23. Inert Gas-Shielded Arc Welding Pure Copper; A.S.M.E. Code Case 934. John W. Mortimer. *Welding Journal,* v. 27, Sept. 1948, p. 715-722.

Attempts to explain, by a related series of experiments, that copper can be successfully welded in a manner acceptable to the A.S.M.E. Code.

22c-24. Welding Copper Motor Connections. W. A. Lloyd. *Iron Age,* v. 162, Sept. 30, 1948, p. 64-66.

Using a special, water-cooled fixture, wires and risers in electric-motor commutators are welded at a high rate. The technique, which employs nonconsumable carbon electrodes, and fixture.

22c-25. Miniature Resistance Welding and Its Application in the Radio Tube Industry. George Freedman. *Welding Journal,* v. 27, Oct. 1948, p. 838-844.

Optimum welding conditions for strip, wire, and tungsten-filament material. Results of a shear-tension study of the welding of 0.005-in. thick nickel strip under varying conditions. The phenomenon of the recrystallization nugget was studied metallographically.

22c-26. Welding a Bronze Bell. Marcus Maynard. *Welding Journal,* v. 27, Oct. 1948, p. 854.

Procedure used in repairing a 6-in. crack in a 1400-lb. bell.

22c-27. Copper Parts Production Welded. H. A. Huff, Jr. *Welding Engineer,* v. 33, Nov. 1948, p. 46-47.

Use of helium-shielded arc welding in mechanized production of rotors for induction motors.

22c-28. Copper-Alloy Arc-Welding Electrodes. *American Machinist.* v. 92, Nov. 18, 1948, p. 141.

Data are confined to chemical specifications, physical properties, and notes on the use of the five groups of electrodes.

22c-29. Materials Joined by New Cold Welding Process. A. B. Sowter. *Materials & Methods,* v. 28, Nov. 1948, p. 60-63.

Production of strong welds in a number of nonferrous materials, particularly aluminum and copper, by simple cold-welding method developed in Great Britain.

22c-30. Inert Gas Welding Process For Copper Tanks. *Western Metals,* v. 6, Nov. 1948, p. 26-27.

Use in production of Cu-alloy hot water tanks.

22c-31. How to Weld Die Castings. Larry Phillips. *American Machinist,* v. 92, Dec. 2, 1948, p. 72-73.

How Zn-base die castings can be successfully welded by the oxy-acetylene torch.

22c-32. How to Weld Zinc Base Die Castings. *Industry and Welding,* v. 21, Dec. 1948, p. 73-78.

Recommended procedures.

22c-33. Tungsten Arc Welded. Clyde B. Clason. *Welding Engineer,* v. 33, Dec. 1948, p. 60, 62.

Development of satisfactory process for arc welding tungsten filaments used in power tubes. "K Monel" is used as a joining metal.

22c-34. Low-Temperature Properties of Lead-Base Solders and Soldered Joints. R. I. Jaffee, E. J. Minarcik, and B. W. Gonser. *Metal Progress,* v. 54, Dec. 1948, p. 843-845.

Solders containing more than about 90% lead were found to retain their ductility and to increase in impact strength at temperatures as low as −295° F. In solders with as much as 50% tin, serious embrittlement and decrease in impact strength occur at subzero temperature. Breaking loads of soldered copper tubing at low temperatures are nearly independent of the kind of lead-base solder used for joining.

22d—Light Metals

22d-1. Inert-Gas Welded Aluminum Tanks. H. R. Toll. *Welding Engineer,* v. 33, Feb. 1948, p. 33-35.

Experiences in building tanks 40 ft. long by 11 ft. o.d.

22d-2. Flame-Brazed Joints in Aluminum Busbar and Their Radiographic Examination. F. Clark and F. P. Vickers. *Welding,* v. 16, Jan. 1948, p. 23-27.

Development work on the brazing of aluminum bars in thicknesses up to ½ in. such as are used in electrical circuits. (To be continued).

22d-3. Further Investigation of Preheating and Postheating in Spot Welding 0.040-In. Alclad 24 S-T. W. F. Hess and F. J. Windsor. *National Advisory Committee for Aeronautics, Technical Note* No. 1440, Dec. 1947, 13 pages.

All welding was done with an a.c. machine, using a program timer to sequence the preheat and weld, or the weld and postheat, cycles. Weld time is very important with regard to the quality of welds produced, With properly prepared surfaces, preheating produced some improvement in quality when the preheat current was sufficiently high in magnitude and of long duration. Postheating had no effect on the weld strength or quality, unless the magnitude of the postheating current was at least equal to that of the welding current.

22d-4. Testing of Electrically Welded Constructional Components of Aluminum Alloys. L. Huguenin. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 27-28. Translated and condensed from *Schweizer Archiv,* v. 13, July 1947, p. 202-210.

Previously abstracted from original article. See item 22-673, R.M.L., v. 4, 1947.

22d-5. The Pressure Welding of Light Alloy Bar Without Fusion. R. F. Tylecote. *Sheet Metal Industries* v. 25, Jan. 1948, p. 155-160, 162, 164.

Investigation of the welding of a series of Al and Mg alloys, using a 10-ton hydraulic press and a multinozzle oxy-acetylene ring burner. Details of welding procedure and results of mechanical tests on the welds, with and without heat treatment.

22d-6. An Important Asset of Magnesium: Weldability. *Magazine of Magnesium,* Feb. 1948, p. 8-11.

Methods for welding magnesium, and practical applications.

22d-7. Macroscopic Examination of Spot Welds in Aluminum. Gerard H. Boss. *Metal Progress,* v. 53, Feb. 1948, p. 227-230.

Part I of an extended survey of wartime developments in the spot welding of aluminum alloys.

22d-8. Welding Aluminum. *Sheet Metal Worker,* v. 39, Feb. 1948, p. 56-58.

A few suggestions for improving welded joint formulation in this metal.

22d-9. Arc Welding of Aluminum and Its Alloys. A. Schärer. *Light Metals,* v. 11, Feb. 1948, p. 77-81. Translated from doctorate thesis based on work in the research laboratories of the Aluminium Industrie—A. G. Neuhausen (Switzerland) under the guidance of A. von Zeerleder.

Various methods are reviewed briefly and gas welding is described in detail, including a method for temperature control of the preheated Al sheets by use of "Thermindex" colors. The atomic hydrogen process.

22d-10. Welding the Light Alloys. Part I. *Light Metals,* v. 11, Feb. 1948, p. 89-95.

First of a series of four articles discusses importance of adequate training and outlines techniques to be described in later installments. (To be continued.)

22d-11. A Note on Soldering Aluminum. Louis D. Statham. *Review of Scientific Instruments,* v. 19, Feb. 1948, p. 116.

Recommends copper plating prior to soldering.

22d-12. The Pressure Welding of Light Alloy Bar Without Fusion. (Concluded.) R. F. Tylecote. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 373-374, 376.

Concludes presentation of results of investigation of the oxy-acetylene welding of a series of Al and Mg alloys. Process is feasible for all of the alloys, but especially for the non-heat treatable Al-Mn and Al, 7% Mg alloys, and for large areas and moderate thicknesses.

22d-13. Are You Fabricating Aluminum? *Industry and Welding,* v. 21, March 1948, p. 48-50, 72-76. Reprinted from "Welding and Brazing Aluminum", revised; Aluminum Co. of America.

Advantages, equipment, cost of gas, preweld cleaning, and welding technique.

22d-14. Arc Welding Magnesium; Investigation on the Elimination of Cracking. P. F. George. *Metal Industry,* v. 72, Feb. 27, 1948, p. 163-165, 173.

Methods of determining the tendency toward weld cracking, such as metallographic methods of finding the nonequilibrium solidus, and elimination of cracking by control of calcium content.

22d-15. Le Probleme des Soufflures dans la Soudure des Alliages Légers. (The Problem of Bubbles in the Welding of Light Alloys.) J. Herenguel. *Soudure et Techniques Connexes,* v. 2, Jan.-Feb. 1948, p. 5-11.

Factors involved in swelling due to bubbles close to the welded joint. It is suggested that control of swelling may be maintained by changes in composition of metal, gas content, conditions of hardening, and transformations.

22d-16. Flame-Brazed Joints in Aluminum Busbar and Their Radiographic Examination. Part III. F. Clark and F. P. Vickers. *Welding,* v. 16, Feb. 1948, p. 67-75, 80.

Development work on the brazing of aluminum bars up to ½ in. such as are used in electrical circuits. Details of radiographic technique. (Concluded.)

22d-17. Resistance Welding of Light Alloys. E. J. Keefe and L. B. Wilson. *Light Metals,* v. 11, March 1948, p. 139-144.

Spot and seam-welding techniques; major difficulties hitherto associated with application of these to aluminum. A patented system, designed to eliminate the principal difficulties together with some experimental results obtained. It consists of interposition of steel strips between the electrodes and the sheets to be welded. This results in reduction of the welding current required, and consequent solution of the problems.

22d-18. The Pressure Welding of Aluminum Alloys. R. F. Tylecote. *Sheet Metal Industries,* v. 25, March 1948, p. 574-578.

General principles for pressure welding of sheet and bars and details of the experimental technique used in preparing pressure welds in the laboratory.

22d-19. Welding Aluminum. Section VI. *Reynolds Metals Technical Advisor,* v. 1, no. 6, p. 3-4.

Reprinted from "Welding Aluminum", Reynolds Metals Co., Louisville, Ky.

22d-20. Welding the Light Alloys. Part II. *Light Metals,* v. 11, March 1948, p. 120-127.

Procedures for aluminum and magnesium-alloy sheet and castings.

22d-21. Resistance Welding of Light Alloys. E. J. Keefe and L. B. Wilson. *Light Metals,* v. 11, March 1948, p. 139-144; see also "New Method of Welding Aluminum Alloys" (Same authors). *Welding,* v. 16, March 1948, p. 94-97.

Spot and seam welding techniques and certain major difficulties hitherto associated with application of these to aluminum. A patented system, designed to eliminate the principal difficulties, together with some experimental results obtained. It consists of interposition of steel strips between the electrodes and the sheets to be welded. This results in reduction of the welding current required, and consequent solution of the problems.

22d-22. Arc Welding of Aluminum and Its Alloys. (Continued.) A. Scharer. *Light Metals,* v. 11, March 1948, p. 161-170. Translated from Doctorate thesis based on work in the Research Laboratories of the Aluminium Industrie, A. G. Neuhausen, Switzerland, under A. von Zeerleder.

Summary of arc-welding techniques and consideration of specific problems involved in welding aluminum. Electrodes and fluxes for arc welding are examined.

22d-23. Recent Magnesium Developments. W. S. Loose. *Modern Metals,* v. 4, April 1948, p. 26-28.

Electroplating magnesium; high-frequency, superimposed, a.c., magnesium, arc welding; and brazing of magnesium.

22d-24. Examination of Light Alloy Flash Welds Made by Aseasvets, Sweden. R. F. Tylecote. *Sheet Metal Industries,* v. 25, April 1948, p. 787-790, 792.

Details of a study of these welds. Tensile properties were satisfactory although elongation in some cases was not as good as usually obtained with fusion welds. (Presented at B.W.R.A. Symposium on Welding of Light Alloys.)

22d-25. Flash Butt Welding of Aluminum Alloys in Sweden. B. Anderson. *Sheet Metal Industries,* v. 25, April 1948, p. 785-786, 792.

Machine used by and opinions of the Swedish firm of "Aseasvets" regarding principles of the above. Methods, and information concerning results obtained. (Presented at B.W.R.A. Symposium on Welding of Light Alloys.)

22d-26. Eliminating Cracking in Magnesium Arc Welds. P. F. George. *Materials & Methods,* v. 27, April 1948, p. 68-71.

Recent research work to determine why cracking occurs and how to select the proper alloy and alloy rod to produce serviceable welds. Correlation between width of solidification range and tendency toward cracking.

22d-27. Welding Aluminum. *Reynolds Metals Technical Advisor,* v. 1, no. 7, 1948, p. 3-4.

Section VII in series from Reynolds 88-page process manual, "Welding Aluminum". Seam welding, flash welding, and brazing methods.

22d-28. Crack-Free Spot Welds. E. J. Clark. *Welding Engineer,* v. 33, May 1948, p. 42-44.

Results of a series of different tests on spot-welded specimens of 0.064-in., 24 ST, Alclad, aluminum-

alloy sheet indicate that the only way to attain spot welds free from internal cracks is to increase electrode pressure.

22d-29. Brazing Aluminum Alloys. H. R. Clauser. *Materials & Methods,* v. 27, May 1948, p. 78-82.

Advantages of brazing for joining Al and Al alloys; development of the process; brazing alloys and fluxes; design and properties of brazed joints; brazing methods; and typical applications.

22d-30. La Chiodatura con Ribattini Esplosivi. (Joining by Means of Explosive Rivets). *Alluminio,* v. 17, Jan.-Feb. 1948, p. 73-84.

Equipment and techniques.

22d-31. Developments in Cold Welding. *Engineer,* v. 165, April 30, 1948, p. 432-433.

Aluminum and aluminum alloys are joined by pressure alone; the pressure being applied by specially designed dies which are mounted in a suitable tool, such as a hand press.

22d-32. Cold Welding. *Metal Industry,* v. 72, May 21, 1948, p. 417-418.

Welding in the cold of Al by pressure alone, using dies.

22d-33. Welded Aluminum Washers. C. B. Curtis. *Welding Engineer,* v. 33, June 1948, 44-45.

Equipment and procedures.

22d-34. Cold Welding of Aluminum and Its Softer Alloys. *Aircraft Production.* v. 10. June 1948, p. 211-212.

Process in which ductile metals are welded by pressure alone, the pressure being applied by specially designed dies mounted in a suitable tool, such as a hand press.

22d-35. Eliminating Cracking in Magnesium Arc Welds. P. F. George. *Welding Journal,* v. 27, June 1948, p. 273s-276s.

Previously abstracted from *Metal Industry,* v. 72, Feb. 27, 1948, p. 163-165, 173. See item 22d-14, 1948.

22d-36. This Unusual Series of Photographs Should Help Avoid Defects in Aluminum Alloy Spot-Welds. C. R. Dixon. *American Machinist,* v. 92, June 17, 1948, p. 98-101.

In addition to a few sound welds, examples of the most common defects.

22d-37. Developments in "Cold Welding". *Machinery,* (London), v. 72, May 27, 1948, p. 648-650.

Pressure joining of Al and its alloys at room temperature.

22d-38. Economical Joining of Magnesium Possible Through New Brazing Method. Paul Klain. *Materials & Methods,* v. 27, June 1948, p. 83-87.

Method developed by Dow.

22d-39. Bonding Rubber to Metal Assemblies. C. H. Mahoney. *Modern Metals,* v. 4, June 1948, p. 22-23.

Methods used in manufacture of aluminum fuel tanks for outboard motors.

22d-40. Welding the Light Alloys. Part III. *Light Metals,* v. 11, June, 1948, p. 337-344.

Flame brazing process for joining aluminum sheet, plate and sections.

22d-41. Heliarc Welding of Aluminum Frames for Coin-Operated Phonographs. *Machinery,* v. 54, July 1948, p. 170-171.

22d-42. Bobbin With Aluminum Flanges. *Modern Metals,* v. 4, July 1948, p. 22.

22d-43. New Welding Process for Light Alloy Bars and Sections. W. Bulian. *Welding,* v. 16, July 1948, p. 291-294. Translated from *Metallforschung,* v. 2, no. 7, 8, 1947.

Method adopted for wrought-aluminum alloys. Method consists of using special molds around pieces to be joined and pouring sufficient molten metal of the same alloy on until mold is properly filled.

22d-44. The Welding of Aluminium Alloys; Work of the Welding Research Team at the University of Birmingham. *Aluminium and the Non-Ferrous Review,* v. 13, Jan.-Mar. 1948, p. 5-6, 8, 10, 12-15.

Summarizes report on the following topics: properties of the Al-Si alloys at temperatures in the region of the solidus; hot-shortness of the Al-Si alloys with particular reference to welding; welding properties of an Al-Mg-Si-Mn alloy and alloys based thereon; hot shortness of the Al-Fe-Si alloys; hot shortness of the Al-Cu-Si alloys; an examination of the tensile properties of a number of Al-Cu-Si alloys; hot shortness of complex Al-Zn-Mg-Cu-Mn alloys; welding and hot shortness properties of the Al-Mg silicide alloys; hot shortness of the Al-Mg-Si alloys; and hot shortness of the more important binary Al alloys. Work by other investigators arising from the findings of the welding research team and a note on the terminology used in the investigations into cracking occurring at temperatures above the solidus during welding and casting.

22d-45. Cold Welding. *Automobile Engineer,* v. 38, July 1948, p. 277-278.

Technique developed by the Gen-

eral Electric Co., for joining, with pressure alone, ductile metals such as aluminum.

22d-46. Fluxless Soldering of Aluminum. Kenneth D. Kahn. *Welding Engineer,* v. 33, Aug. 1948, p. 54, 56, 58.

"Sonodizing", a newly developed technique for application of magnetostrictive vibratory forces to soldering of aluminum alloys.

22d-47. Joining Light-Alloy Sheet. *Aircraft Production,* v. 10, Aug. 1948, p. 265.

Simple pierce-riveting process for unstressed components.

22d-48. Uber ein Schweissverfahren zum Verbinden von Stangen und Profilen aus Legierungen der Gattungen MgAl 6 und MgAl 7. (A Method of Welding Structural Components of MgAl-6 and MgAl-7 Alloys.) Walter Bulian. *Metallforschung,* v. 2, July-Aug. 1947, p. 249-251.

A method of "cast-welding" the Mg-Al alloys, and the macro and microstructures of the welding zones. Tensile strengths of acetylene welded and "cast-welded" samples. 11 ref.

22d-49. Welding the Light Alloys. Part IV. *Light Metals,* v. 11, July 1948, p. 381-385.

Argonarc process, particularly as applied to aluminum and magnesium.

22d-50. Arc Welding of Aluminium and Its Alloys. A. Schärer. *Light Metals,* v. 11, July 1948, p. 397-403.

Theoretical and practical aspects of fluxing, the physics of the arc, and reactions at the metal surface.

22d-51. Developments in Cold Welding. *Machinery Lloyd* (Overseas Edition) v. 20, July 17, 1948, p. 95-97.

Method and applications.

22d-52. Inert-Gas-Welded Aluminum Pipe Line. *Modern Metals,* v. 4, Aug. 1948, p. 16.

Construction of a 2-mile aluminum pipe line, all inert-gas welded, recently completed at Magnolia, Arkansas. The purpose in using this aluminum pipe was to eliminate corrosion which occurs in the steel pipe and which is caused by "sour" oil.

22d-53. Aluminum Fuel Tank Welding. *Steel,* v. 123, Aug. 23, 1948, p. 104, 106.

Recommendations designed to meet Underwriters' Laboratory requirements.

22d-54. Svareni hliniku a hlinikovych slitin. (Welding of Aluminum and Its Alloys.) Miroslav Brzobohaty. *Hutnické Listy,* v. 3, April-May 1948, p. 126-133.

Various methods, and the mechanical properties resulting from the different methods as applied to the various types of Al alloys.

22d-55. Aluminum Pipe Line. M. R. Rivenburgh. *Welding Engineer,* v. 33, Sept. 1948, p. 42-43, 64-65.

Use of inert-gas arc-welding process in the Arkansas-Louisiana oil fields on an experimental aluminum pipe line.

22d-56. Arc Welding of Aluminum and Its Alloys. (In Russian.) V. I. Romanovskii. *Avtogennoe Delo* (Welding), May 1948, p. 18-20.

Recommended procedures for the above, including comparative data on different electrode coatings.

22d-57. Arc Welding of Aluminium and Its Alloys. (Continued.) A. Schärer, *Light Metals,* v. 11, Aug. 1948, p. 461-470.

Experiments and results in welding of unalloyed aluminum. Speed of arc welding with that of oxyacetylene welding. Data on mechanical aluminum. (To be continued.)

22d-58. Aluminum Furnace Brazing. P. A. Koerner. *Machine Design,* v. 20, Sept. 1948, p. 128.

Use for fabrication of two aircraft parts. Four advantages over other joining methods for aluminum parts.

22d-59. Arc Welding of Aluminium and its Alloys. (Continued). A. Schärer. *Light Metals,* v. 11, Sept. 1948, p. 512-523. Translated from Doctorate thesis based on work in the Research Laboratories of the Aluminium Industrie, A. G. Neuhausen, Switzerland, under A. von Zecrleder.

Details of results of work on mechanical properties of welds made with Al-Si electrodes; welding of Al sheets of various thicknesses; fillet and lap welds; welding of pressure vessels; structure of the welded seam; and corrosion resistance of the weld deposit.

22d-60. Fatigue of Gusseted Joints. Howard H. Langdon and Bernard Fried. *National Advisory Committee for Aeronautics, Technical Note* No. 1514, Sept. 1948, 40 pages.

Tests run on gusseted joints to determine the effect of gusset edge finish on fatigue life and to compare riveted 24 S-T joints with spot welded 24 S-T joints.

22d-61. A Case History of Flash Welding Aluminum. *Modern Metals,* v. 4, Sept. 1948, p. 30-31.

Methods and equipment for flash welding 61 S bar stock to 61 S tubing as developed for a job having rigid specifications.

22d-62. Magnesium Lift Floats Brazed Successfully. *Modern Metals,* v. 4, Sept. 1948, p. 29.

Brazing process used in manufacture of hydraulic-lift floats.

22d-63. The Work of the Welding Research Team at the University of Birmingham, July 1944 to January 1947. *Aluminium Development Association* (London), *Research Report* No. 1, Dec. 1947, 35 pages.

Analysis of research undertaken by the team.

22d-64. Contact Welding of Aluminum Alloys in the Automotive Industry. (In Russian.) F. E. Tret'yakov and B. D. Orlov. *Avtogennoe Delo* (Welding), July 1948, p. 22-23.

Methods and equipment.

22d-65. Welded Assembly of Aluminum Die Castings. *Die Castings,* v. 6, Oct. 1948, p. 28. 65-66.

Use of low-temperature oxygen acetylene welding to assemble two aluminum die castings into a "one-piece" housing for a fluid coupling used on automatic washing machines.

22d-66. Weatherwise Welded Awning. Henry Charles Suter. *Welding Engineer,* v. 33, Oct. 1948, p. 68.

When it rains, new awning will lower itself automatically. Its framework is made of aluminum aircraft tubing.

22d-67. The Effect of Wave Shape in Inert-Arc Welding Circuits. R. W. Tuthill. *Welding Journal,* v. 27, Oct. 1948, p. 785-788.

Analysis of an a.c. inert arc when welding aluminum showing an inherent arc characteristic which results in a flow of direct current. How this direct current may be generated and maintained, together with some of the factors which govern its size and effect. Effects on arc stability, penetration, power in the arc, contour of the weld, and primary power supply. Methods of removing this direct current.

22d-68. Field-Erected Storage Tanks of Aluminum. Fred L. Plummer. *Welding Journal,* v. 27, Oct. 1948, p. 796-804.

As used in various industries. Use of combined aluminum and steel tanks is said to have many advantages for storage of corrosive crudes. Design and welding procedures.

22d-69. Brazing Aluminum. G. W. Birdsall. *Welding Journal,* v. 27, Oct. 1948, p. 855-856. Reprinted from "Welding Aluminum", Reynolds Metals Co., Louisville, Ky.

22d-70. Preliminary Test of Spot-Weld Shunting in 24 S-T Alclad. A. R. Hard. *Welding Journal,* v. 27, Oct. 1948, p. 491s-495s.

An attempt was made to isolate the strength loss due to shunting in single-row spot welded joints. Tests of welds made at various spacings show a decline in strength per weld at closer spacings. Most of this decline was found to be caused by factors other than weld shunting. The effect of wire buffing and chemical treatment in pre-weld cleaning. A method of measuring shunt-path resistance through a spot weld was developed.

22d-71. The Effect of D.C. Component in A.C. Inert-Gas Arc Welding of Aluminum. G. J. Givson and G. R. Rothschild. *Welding Journal,* v. 27, Oct. 1948, p. 496s-501s.

The nature of the d.c. component is shown by oscillograms of welding current and voltage. The question of measuring the effective values of welding current and meters used in the welding tests. Methods of controlling the d.c. component and tests on aluminum plates.

22d-72. Application of Methane for Welding Thick-Walled Aluminum Containers. (In Russian.) V. V. Danilevskii. *Avtogennoe Delo* (Welding), Aug. 1948, p. 27.

Proposed substitution of natural gas containing 94.8% CH_4 for acetylene. Method of welding and optimum conditions.

22d-73. Gas Welds in a High Strength Aluminum-Zinc-Magnesium-Copper Alloy. J. Pendleton. *Welding Research,* v. 2, (Bound with *Transactions of the Institute of Welding,* v. 11), Oct. 1948, p. 87r-93r.

Welds were made in an Al alloy containing approximately 5.5% Zn, 2.8% Mg, and 0.5% Cu, using 18, 14 and 10 S.W.G. sheets (with a variety of heat treatments before and after welding) and examined mainly by means of tensile tests and hardness explorations. 20 ref.

22d-74. Further Investigations on the Pressure Welding of Light Alloy Sheet. R. F. Tylecote, *Welding Research,* v. 2, (Bound with *Transactions of the Institute of Welding,* v. 11), Oct. 1948, p. 94r-108r.

It was found that substantial improvement can be obtained by solution heat treatment of welds made with small reductions in sheet thickness in clad duralumin-type alloys. Attempts to weld high-purity aluminum between rollers at room temperature were successful and it is believed that cold welding may be possible with other forms of tool.

Means of applying pressure welding industrially by use of an electrical "projection welding" machine to supply heat and pressure automatically. 13 ref.

22d-75. The Practical Fundamentals of Aluminum Brazing. N. F. Ritchey and C. Bruno. *Western Metals,* v. 6, Nov. 1948, p. 22-25.

22d-76. Spot Welding Improves Quality of Strato Ships. *Modern Industrial Press,* v. 10, Nov. 1948, p. 54, 56, 58-60.

Use in production of Boeing Stratocruisers and Stratofreighters.

22d-77. Joining of High-Strength Aluminum. *Iron Age,* v. 162, Nov. 18, 1948, p. 98. Based on "Investigations on the Welding of High-Strength Aluminum Alloys," PB92831, Library of Congress, Photoduplication Service, Publication Board Project, Washington, D. C. $8.75, photostat; $3.00, microfilm.

Recent work.

22d-78. Torch-Brazing Aluminum. G. W. Birdsall. *Steel,* v. 123, Nov. 29, 1948, p. 82-85.

Good and poor joint design, alloys of Al which can be brazed, jigs and fixtures, cleaning and brazing practice, and flux removal.

22d-79. Inert Arc Goes Metal Arc. Jesse S. Sohn and A. N. Kugler. *Welding Engineer,* v. 33, Dec. 1948, p. 54-55.

Development of a practical gun makes possible a new gas-shielded arc process with many possibilities for aluminum welding.

22d-80. New Development in Inert-Arc Welding. *Industry and Welding,* v. 21, Dec. 1948, p. 49-51.

New process involves feeding a consumable wire through the barrel of a welding gun. Filler metal carries welding current. "Aircomatic" process may be used for welding heavy sections of Al and Al alloys.

22d-81. Torch-Brazing Aluminum. *Reynolds Metals Technical Advisor,* v. 1, no. 9, [1948], p. 1-2.

Recommended procedures.

22d-82. Arc Welding of Aluminium and Its Alloys. A. Scharer. *Light Metals,* v. 11, Nov. 1948, p. 631-638.

Corrosion tests and welds in specific

22d-83. Optimum Flash Welding Conditions—The Importance of Temperature Measurements. R. M. Curran, P. Patriarca, and W. F. Hess. *Welding Journal,* v. 27, Dec. 1948, p. 577s-592s.

Results of a study of temperature distributions and the effect thereon of voltage, flashing distance, section size, clamping distance, and thermal properties in the flash welding of aluminum alloys.

22d-84. High-Purity Helium for Welding. William A. Mays. *Metal Progress,* v. 54, Dec. 1948, p. 848.

Advantages of welding-grade helium (99.8%+) recently made available by the Bureau of Mines, for shielded-arc welding of aluminum.

22d-85. Argonarc Welding. *British Welding Research Association* (London), May 1947, 44 pages.

Consists of four papers dealing with argonarc welding of Mg-rich alloys. Individual papers are abstracted separately.

22d-86. Argonarc Welding of Magnesium-Rich Alloys. R. E. Doré, L. C. Percival, and R. R. Sillifant. "Argonarc Welding", British Welding Research Association, May 1947, p. 1-25.

A summary of results of investigations on welding technique and procedure; use of high-frequency current for stabilizing the arc; welding of American magnesium alloys and welding of metals other than magnesium. Results of tests on Mg-Mn alloy and an Mg-Al-Zn alloy.

22d-87. Argonarc Welding of Magnesium Alloys at High Duty Alloys, Ltd. E. J. Grimwood. "Argonarc Welding", British Welding Research Association, May 1947, p. 26-34.

Experiences with argonarc welding under experimental conditions.

22d-88. Some Notes on an Investigation of the Hand Method of Argonarc Welding as Applied to Magnesium Base Alloys, F. A. Fox. "Argonarc Welding", British Welding Research Association, May 1947, p. 35-39.

An investigation made to determine the efficiency of welded joints in various Mg-base alloys using the manual process. Results of tensile tests on unbacked, plain butt-welds and compares them with welds made by heliarc process

22d-89. Argonarc Welding of Magnesium Alloys at Metropolitan-Vickers Electrical Co., Ltd. I. H. Hogg. "Argonarc Welding," British Welding Research Association, May 1947, p. 40-42.

Investigations carried out at Metropolitan-Vickers Electrical Co., Ltd., to develop apparatus and technique suitable for the welding of magnesium-base alloys in an atmosphere of argon. Ten gage Electron-AM503 sheet similar to Dowmetal-M was used throughout the experiments. Types of joints made possible by argonarc technique.

SECTION XXIII

APPLICATIONS

23a—General

23a-1. Detroit-Evolution, Not Revolution. W. G. Patton. *Iron Age,* v. 161, Jan. 1, 1948, p. 156-167.

What to look for in the 1948-1949 cars as well as in the car of 1952. New and improved production techniques include: use of stainless-clad bumpers; use of extruded and rolled aluminum sections; a complete overhaul of existing forging practice, including better materials handling, new heating practice, substitution of hot extrusion for many hammer and press operations, and use of salt baths for preheating and annealing; use of lower carbon in gears; use of automatic transfer devices; expansion of projection welding; improvements in foundry operations.

23a-2. For Top-Notch Diesel Operation Know Your Sleeve-Bearing Fundamentals. *Power,* v. 92, Jan. 1948, p. 84-87, 160, 166. Based on four papers presented at 19th National Oil and Gas Power Conference of the A.S.M.E., by E. Crankshaw and G. W. LaPier; B. J. Esarey; W. Thill; and D. B. Wood.

Improved bearings developed to meet today's heavier demands. (To be continued.)

23a-3. Zink und Eisen. (Zinc and Iron.) Artur Kutzelnigg. *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Österreichs,* v. 1, Oct. 1947, p. 89-91.

The many possible combinations of zinc and iron and their uses. 21 ref.

23a-4. Materials Used in the New Buick Automatic Transmission. Herbert Chase. *Iron Age,* v. 161, Jan. 15, 1948, p. 74-77.

Materials include die castings, plaster castings, gray-iron castings, rolled steel, various copper-base alloys and synthetic rubber. An explanation of the general functioning of the components.

23a-5. Wire in the Automobile. F. Titus Updike. *Wire and Wire Products,* v. 23, Jan. 1948, p. 29, 31-34.

Uses of wire in a modern motor car. (Presented at Annual Wire Association Convention, Chicago, Oct. 1947.)

23a-6. Alloys for High-Temperature Service. *Metal Industry,* v. 71, Dec. 26, 1947, p. 524.

New developments as revealed by recent papers.

23a-7. Improved Metals Promise Design Progress. *Machine Design,* v. 20, Jan. 1948, p. 103-107.

Important recent developments in low and high-alloy steels; stainless steels; cobalt-base alloys; and powder metallurgy.

23a-8. Selection of High-Temperature Materials for Gas Turbines. Rebecca H. Smith. *Iron Age,* v. 161, Jan. 22, 1948, p. 56-60.

Metallurgical and economic factors.

23a-9. Heat Resistant Alloys for Use in Jet Propulsion Engines. J. W. Freeman, E. E. Reynolds and A. E. White. *Journal of the Aeronautical Sciences,* v. 14, Dec. 1947, p. 693-702.

Problems involved in their development for rotor disks and blades, flame tubes, tail pipes, and nozzle assemblies. Alloy types reviewed are: hardenable ferritic steels; austenitic-base alloys; age-hardenable alloys; and precision-cast alloys. Future prospects for development.

23a-10. Permanent Magnets of Sintered Oxides. R. J. Studders. *Product Engineering,* v. 19, Feb. 1948, p. 120-122.

Raw materials are fine oxide powders, minus 200 mesh, and of the type and purity widely used in the ceramic industry. A typical mix consists of 31.0% red ferric oxide, Fe_2O_3, 43.0% black magnetic ferrosoferric oxide, Fe_3O_4, and 26.0% cobaltous oxide, CoO. Fabrication methods, physical and electrical properties; magnetic properties and design data; and effects of heat, vibration, and aging.

23a-11. Roller Bearings for Freight Cars. M. S. Downes. *Railway Age,* v. 124, Feb. 14, 1948, p. 62-63.

Use and operating and maintenance advantages. (Presented at A.S.M.E. annual meeting, Atlantic City, Dec. 4, 1947.)

23a-12. Modern Bearing Materials Meet Tough Demands of Diesel Service Conditions. *Power,* v. 92, Feb. 1948, p. 74-77.

Selection of bearing materials, especially as affected by introduction of new alloys and combinations of metals.

23a-13. Structural Materials. *Aircraft Production* v. 10, Feb. 1948, p. 42-43.

Brief notes on the use and properties of high-grade steels and light alloys in large aircraft.

23a-14. Die Casting in the Austin "Devon" Four-Door Saloon. E. N. Field. *Machinery* (London), v. 72, Jan. 29, 1948, p. 153-154.

More than 40 separate items in new British automobile are produced as Zn-alloy die castings.

23a-15. Bearing Selection. Bryce T. Ruley. *Product Engineering,* v. 19, March 1948, p. 149-151.

Calculation of anti-friction bearing life and its relationship to load. Nomograph for speed and life factor.

23a-16. Antifriction Bearings. H. O. Smith. *Factory Management and Maintenance,* v. 106, March 1948, p. 105-115.

Types available and recommended maintenance methods.

23a-17. The Wall of Thin Self-Framed Metal Panels. Robert L. Davison and Howard T. Fisher. *Architectural Record,* v. 103, Feb. 1948, p. 135-139.

The research described was intended to furnish architects and manufacturers with the basic design for a fireproof light-weight wall system which would be applicable to conventional steel or concrete building frames; which would satisfy requirements of fire resistance, weather resistance, insulation, and lack of condensation; which would be mainly shop-fabricated; and which would have a lower first cost and lower maintenance than a conventional wall.

23a-18. Some Notes on the Design, Development and Production of High-Speed Compression-Ignition Engines. (Concluded.) S. Markland and N. Tattersall. *Engineers' Digest,* v. 5, Feb. 1948, p. 81-84. Condensed from an advance copy of a paper for Institution of Mechanical Engineers, Automobile Division, Oct. 1947.

Crankcase and cylinder castings; timing gear and auxiliary drives; pistons; connecting rods; valves; fuel-injection equipment; lubrication systems; detergent oils; cold starting; and testing.

23a-19. Plastic, Rubber Moldings and Metal Parts Combined to Advantage. Herbert Chase. *Materials & Methods,* v. 27, March 1948, p. 67-71.

Combinations of conducting and dielectric properties are provided in electrical parts by judicious use of molded sections containing metallic inserts.

23a-20. Precision Castings in High-Melting Point Alloys for General Engineering Purposes. Frank Hudson. *Metallurgia,* v. 37, March 1948, p. 243-247.

Factors which have a bearing on economic production methods and possible new applications for such castings.

23a-21. Wire Forms. Part I. Herbert Chase. *Wire and Wire Products,* v. 23, April 1948, p. 303-305, 348-350.

Includes applications and production methods.

23a-22. They Pull Profits Up; Pull Expenses Down. *Modern Industry,* v. 15, April 15, 1948, p. 46-49.

Miscellaneous shapes and applications of magnets in production. One company alone has developed 24,000 uses.

23a-23. Wire Forms. Part II. Herbert Chase. *Wire and Wire Products,* v. 23, May 1948, p. 394-398, 438.

Gives details of selection of wire, coated or uncoated, for various applications; and rules for design of products in which wire forms are incorporated.

23a-24. Furnaces Save Propeller Costs. John D. Waugh. *Automotive Industries,* v. 98, May 15, 1948, p. 40-42, 80, 82, 85.

Development of more economical fabrication techniques for the Aeromatic variable-pitch propeller. Tables show comparative costs of: (1) forged and welded hubs; (2) solid and copper-brazed blade ferrules; and (3) two-piece and one-piece plastic blade coverings. In each case considerable savings were achieved by adoption of the latter alternative.

23a-25. Examen De Cables Conducteurs en Almelec et en Aluminium-Acier Deposes Apres 15 a 25 Ans de Service. II. Observations Faites sur les Cables en Aluminium-Acier. (Investigation of High-Tension Cables Made of Almelec and of Aluminum With Steel Core After 15 to 25 Years Service. Part II. Observations Made on Cables of Aluminum With Steel

Core.) Jean Herenguel. *Revue de l'Aluminium,* v. 25, March 1948, p. 73-78.

Use of galvanized steel wire and aluminum wire. Properties of each and corrosion resistance of these materials in service.

23a-26. Materials at Work. *Materials & Methods,* v. 27, May 1948, p. 72-74.

Magnesium aircraft skin; rubber propellors for outboard motors; corrosion-proof motor; embossed aluminum sheet in various patterns; aluminum shipping units which are transferred from truck trailer to boxcar; and magnesium-housed binoculars.

23a-27. Copper-Covered Steel Proves Useful for a Variety of Applications. Harold A. Knight. *Materials & Methods,* v. 27, May 1948, p. 75-77.

A permanent bond exists between the copper and steel through formation of a Cu-Fe alloy. This material, which has been widely used in the electrical industry for many years, is now being selected for a variety of parts requiring strength and corrosion resistance.

23a-28. Metals and Plastics. Robert G. Chollar. *ASTM Bulletin,* No. 153, May 1948, p. 80-87; discussion, p. 87.

Relative properties of the various commercially available metals and alloys and plastic materials for different uses. The discussion is illustrated by various examples of parts for business machines. 51 ref.

23a-29. Recent Developments in Metal Bellows. Rolt Hammond. *Machinery Lloyd* (Overseas Edition), v. 20, May 22, 1948, p. 107-108.

23a-30. Trailer Bodies Made From Subassembled Components. *Products Engineering,* v. 19, June 1948, p. 102.

23a-31. High-Temperature Alloys; Some Aspects Associated With Their Development for the Gas Turbine. A. Dunlop. *Metal Industry,* v. 72, May 28, 1948, p. 437-439; June 4, 1948, p. 457-459.

Trend of development in the U. S., England, and Germany. Comparative creep and fatigue properties. 14 ref.

23a-32. Materials at Work. *Materials & Methods,* v. 27, June 1948, p. 90-92.

Impregnated fabric cutoff wheel for use in cleaning and snagging operations on both ferrous and nonferrous casting; plastic lens for photo-electric light meter; Cu-Ni-Co magnets replace jewel bearings; aluminum pipe line for "sour" crude; abrasion resistant rubber for shotblast rooms; music from super-tensile steel wire having a tensile strength of approximately 460,000 psi.; and plastic auto top.

23a-33. Substitute Materials for Overhead Wires for Tramway and Trolleybus Services. L. Albert. *Engineers' Digest* (American Edition), v. 5, May-June, 1948, p. 193-194. Translated and condensed from *Revue de l'Aluminium,* v. 25, Jan., 1948, p. 3-12.

Previously abstracted from original source. See item 23d-50, 1948.

23a-34. How to Choose the Best Alloy for Your Die Castings. Herbert Chase. *Electrical Manufacturing,* v. 42, July 1948, p. 102-107, 160, 162, 164.

Compositions, properties and typical applications.

23a-35. Preplanning Turnarounds, Use of Alloys Shorten Downtime, Extend Onstream Periods for Operating Distillation Equipment. Arch L. Foster. *Oil and Gas Journal,* v. 47, July 1, 1948, p. 72-73, 76.

Procedures and selection of alloys for different jobs at refineries.

23a-36. New Metals for Old. Edward Appleton. *Proceedings of the Institute of British Foundrymen,* v. 40, 1946-1947, p.A20-A29.

10th Edward Williams Lecture. Progress in metal development, applications to manufacture of new items, and ways in which scientific inquiry and experimental measurements have led to discovery of better metals for practical use.

23a-37. Materials at Work. *Materials & Methods,* v. 28, July 1948, p. 62-65.

Cast-Al trailer wheels; colored-plastic-coated metal tubing; nylon wheel bearings; monel roofing; magnesium transfer spouts for gasoline; glass cloth as aid in stretch-forming of Mg; phosphorescent-paint signs; and plastic insulation for magnetic coils.

23a-38. Turbine Blades That Resist Heat. Harold Woodhouse. *Aero Digest,* v. 57, Aug. 1948, p. 74, 76, 117.

Various materials available for production of these blades.

23a-39. The Manufacture of Bolts and Nuts. Part II. R. C. Rhoades. *Steel Processing,* v. 34, Aug. 1948, p. 423-426.

Production with automatic machinery.

23a-40. Rigidizing Finds New Applications. *Automotive Industries,* v. 99, Sept. 1, 1948, p. 38.

Several applications of pattern process for design-strengthening ferrous and nonferrous flat-rolled metals.

23a-41. Cutting Tool and Die Materials. (Continued.) *Steel,* v. 123, Aug.

30, 1948, p. 64-66, 68, 70; Sept. 6, 1948, p. 96-100, 102, 104, 106, 109; Sept. 13, 1948, p. 106-110, 112, 114.

This information on cutting tool and die materials lists factors to be considered in the quick selection of toolsteels and carbide types to meet any given requirement. Sources, trade names and applications are conveniently presented. Other pertinent data include chemical analyses, heat treatments, quenching media, movement in hardening and machinability as annealed.

23a-42. Construction Materials for Jet Pumps. Mark Richelson. *Chemical Engineering,* v. 55, Sept. 1948, p. 114-117, 248, 250, 252.

Tables and text facilitate selection of materials.

23a-43. Materials at Work. *Materials & Methods,* v. 28, Sept. 1948, p. 80-82.

Rubberlined valve for handling sand suspended in water; gas-intake pipe made of three different steels for aircraft engine; bimetal pressure-cooker lid; Cr-plated aircraft landing-gear struts; aluminum ship stacks; and plastic holders for large mechanically operated brushes used to wash railway cars.

23a-44. Cutting Tool and Die Materials, VI and VII. *Steel,* v. 123, Sept. 27, 1948, p. 92-94, 96, 98, 100; Oct. 4, 1948, p. 84-86, 88, 90, 93.

Tabulation of information.

23a-45. Plain Sleeve Bearings; Materials and Design. *Product Engineering,* v. 19, Oct. 1948, p. 129-160.

Bearing performance factors; design concepts; bearing types; engine bearing requirements, materials and current designs; porous bearings; wood bearings; carbon-graphite bearings; cast iron and steel bearings; plastic-laminate bearings; rubber bearings; and hydrodynamic bearings. 31 ref.

23a-46. Precision Investment Castings Reduce Assembly Operations. Edwin Laird Cady. *Materials & Methods,* v. 28, Oct. 1948, p. 78-80.

Seven examples that show how precision investment castings reduce costs, speed production, and improve product design.

23a-47. Product Improvement Through the Use of Porcelain Enamel. Horace R. Whittier. *Finish,* v. 5, Nov. 1948, p. 29-30, 70, 72.

Uses of porcelain enamel in items such as telephone dials, street signs, and similar applications.

23a-48. Moulds—for Pre-Cast Concrete. *Light Metals,* v. 11, Oct. 1948, p. 549-563.

Varied applications of different metals and alloys for this purpose. Advantages of Al and Mg.

23a-49. Metal Powder Parts Replace Those Produced by Other Methods. H. R. Clauser. *Materials & Methods,* v. 28, Nov. 1948, p. 64-68.

Six case histories showing how metal powder parts can replace conventional metal forms.

23a-50. Ceramics Get Seven-League Boots. *Modern Industry,* v. 16, Nov. 15, 1948, p. 50-53.

Various new applications, including metal-ceramic combinations.

23a-51. An Examination of Aluminum-Alloy Cables After 15 to 25 Years Service. J. Hérenguel. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 151-154.

Previously abstracted from original French in *Revue de l'Aluminium,* v. 24, Dec. 1947, p. 357-360; v. 25, March 1948, p. 73-78. See item 23a-25, 1948. (Includes data on galvanized steel wires used as cable cores.)

23a-52. People Get Hungry Together. *Inco Magazine,* v. 22, no. 4, 1948, p. 22-23.

Applications of stainless steel and monel in miscellaneous restaurant and cafeteria equipment.

23a-53. Materials at Work. *Materials & Methods,* v. 28, Dec. 1948, p. 88-90.

Briefly describes and illustrates the following: all-metal door mat (Al and Zn); Ni-Cu alloy pickling hook; improved wave length standard from Hg^{198}; flat-plate welded fittings for natural-gas line; "densified wood" chucks for spinning Al parts; nailable steel flooring; phenolic pump parts; high-strength, low-alloy dipping basket for pickling; and W-Ni-Cu alloy of high density, high-tensile strength, ease of fabrication, and high corrosion resistance.

23a-54. Vicalloy—a Workable Alloy for Permanent Magnets. E. A. Nesbitt. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 167, Iron and Steel Division, 1946, p. 222-223.

Condensed from *Metals Technology,* Feb. 1946, T. P. 1973. (See item 3-46, 1946). The paper also appeared in full in *Trans. AIME.,* v. 166, 1946, p. 415. (Item 23-564, 1947).

23b—Ferrous

23b-1. A Prototype Stainless Steel Coach. *Engineer*, v. 184, Nov. 28, 1947, p. 512-513.

23b-2. Steel Castings; Uses as Engineering Materials. John A. Rassenfoss.

American Foundryman, v. 12, Dec. 1947, p. 38-44, 59.
Previously abstracted from *Steel*, see 23-551, R.M.L., v. 4, 1947.

23b-3. C.A.A. Segmented Airport Marker Utilizes Porcelain Enamel. *Finish*, v. 5, Jan. 1948, p. 22-23.
New application of enamel.

23b-4. How We Use Porcelain Enamel in the Production of Electric Signs. Herbert B. Link. *Finish*, v. 5, Jan. 1948, p. 27-29.

23b-5. Stainless Steels for the Chemical Engineering Industries. I. Berkovitch. *Iron and Steel*, v. 20, Dec. 1947, p. 648.
Reviews paper on the general resistance to corrosion of various commercial stainless steels by L. Rotherham, presented to the Society of Chemical Industry.

23b-6. Welded Highway Deck Cuts Dead Load on Eads Bridge. Joshua D'Esposito, Jr. *Engineering News-Record*, v. 140, Jan 8, 1948, p. 88-91.

23b-7. Stainless Steel Railway Coach. *Engineering*, v 164, Dec. 19, 1947, p. 584-586, 588
Manufactured by Budd in Philadelphia.

23b-8. Maintenance of Stainless Steel Equipment in Refineries. Article 1. Types and Their Applications, Welding, Intergranular Corrosion. W. G. Renshaw. *Petroleum Processing*, v. 3, Jan. 1948, p. 25-28.
Types useful when sulphur compounds are encountered are described, as well as those suitable for applications at high and subzero temperatures.

23b-9. Development of a Successful Hard-Surfaced Bit for Drilling Oil Shale. Tell Ertl, John R. Wagner, Jr., and Ernest E. Burgh. *Bureau of Mines, Report of Investigations* 4177. Jan. 1948, 8 pages.
Design of bits and method used for hard surfacing. The material used was "acetylene tube borium" manufactured by Stoody Co. It consists of steel tubes containing accurately sized particles of cast tungsten carbide. The resulting bits showed excellent wear properties in oil shale.

23b-10. Radiant Heating With Steel Cable. Reuben S. Tice. *Western Metals*, v. 6, Jan. 1948, p. 46-47.
Unique system in which steel cable coated with zinc, and laid between the floor beams or embedded in concrete, serves as a resistance network for heating purposes. The current supplied is low-voltage and high-amperage and operates at about 110° F. to produce floor temperatures of 70 to 74° F.

23b-11. What the User Should Know About Tubing. E. J. DeWitt. *Machinery*, v. 54, Feb. 1948, p. 165-169.
Principal classifications, characteristics, and fabrication of tubes of ferrous materials. (First of two installments.)

23b-12. Body Engineers Hear of Light Automobile Ideas, Study Structures, Materials. *SAE Journal*, v. 56, Feb. 1948, p. 77-78.
Reviews three papers and accompanying discussion devoted to automotive body design and use of low-alloy, high-tensile steels, presented at S.A.E. annnal meeting, Detroit, Jan. 12-16, 1948.

23b-13. Which Wrought Stainless Steel? Part I. Properties and Processability. Stanley P. Watkins and Roland J. Berkol. *Machine Design*, v. 20, March 1948, p. 107-112.
Properties and applicabilities of the various types compared and correlated. (To be continued.)

23b-14. New Developments in Tool Steels—Part I. George A. Roberts. *Tool & Die Journal*, v. 13, March 1948, p. 76-78, 80.
A review. (To be continued.) (Presented to Cleveland Chapter, A.S.M., Oct. 6, 1947.)

23b-15. Selecting Automotive Steels. W. E. Jominy. *Steel*, v. 122, March 8, 1948, p. 82-86, 122, 124.
Some of the more important factors involved in predicting fabricating behavior and mechanical performance of steel in a particular part. Recent experience indicates that much cheaper steels can be used than were formerly thought necessary. Use of proper heat treatment is said to minimize differences between the various alloy steels.

23b-16. Metal Molds for Plastics. Thomas A. Dickinson. *Tool Engineer*, v. 20, March 1948, p. 27-32.
Use of a preliminary test casting to determine whether a given plastics part can be profitably produced. Mold design.

23b-17. Metal Mining and Manganese Steel—Tough Jobs for Manganese Steel. *Edgar Allen News*, v. 26, Feb. 1948, p. 997-1000.
A number of applications.

23b-18. Another Air Marker of Porcelain Enameled Steel. Christian E. Born. *Finish*, v. 5, March 1948, p. 24-27.
Letters 20 ft. high mark Unity Plant of Portland Packing Co.

23b-19. How to Choose the Correct Type of Porcelain Enamel for Specific

Applications. Part I. J. E. Hansen. *Finish,* v. 5, March 1948, p. 37-38, 64, 66.

23b-20. Manufacturers Continue to Convert to Stampings. *Steel Processing,* v. 34, March 1948, p. 134-136.

Miscellaneous applications of stamped sheet steel.

23b-21. Revolutionary Cessna Landing Gear Relies on Chromium-Vanadium Steel Springs. *Vancoram Review,* v. 5, no. 3, 1948, p. 3-5, 20.

Includes mechanical properties of steel used (S.A.E. 6150), and results of service tests.

23b-22. A Porcelain Enameling Application to a Private Home. *Better Enameling,* v. 19, March 1948, p. 11-13.

Concrete-block home with exterior walls faced in acid-resisting, porcelain-enameled, steel-flanged panels. The panels are individually attached to the blocks at the time of erection by a specially designed patented clip.

23b-23. Research on "Thin Skin" Panels of Steel Being Pushed to Replace Masonry Walls. *Brick & Clay Record,* v. 112, March 1948, p. 38.

Development of wall system for curtain wall construction.

23b-24. Porcelain Enameled Garden Furniture After Eight Years of Outdoor Use. *Finish,* v. 5, April 1948, p. 27.

Photograph shows excellent durability.

23b-25. Latest Uses of Alloy Steels in Motor Vehicles. M. J. Day. *Automotive Industries,* v. 98, April 1, 1948, p. 26-27, 58.

Various types and their specific applications.

23b-26. Porcelain Enameled Murals Incorporated in Theater Restaurant Front. *Finish,* v. 5, April 1948, p. 28, 42.

23b-27. Modern Cast Irons; Application—Properties—Manufacture. A. M. Ondreyco. *Western Machinery and Steel World,* v. 39, April 1948, p. 90-93.

Emphasizes Meehanite types.

23b-28. Roller Bearing Applications for Modern Freight Cars. M. S. Downes. *American Society of Mechanical Engineers, Paper* No. 47-A-135 (Advance Copy), 1947, 3 pages.

Applications and advantages.

23b-29. Bearing Construction With Cast Iron as Anti-Friction Material. M. S. Karpyshev. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 153. Translated and abstracted from *Vestnik Machinostroenia,* (Bulletin of the Machine Industry), v. 16, No. 11-12, 1946, p. 24-29.

Experimental results which indicate that cast-iron bearings will give satisfactory service under more severe conditions of pressure and rubbing rates, provided accurate fabrication techniques are followed.

23b-30. Steel-Framed Structures Alleviate Britain's Low-Cost Housing Problem. Donovan H. Lee. *Civil Engineering,* v. 18, June 1948, p. 46-48.

Development of semi-prefabricated type of house.

23b-31. High-Strength Low-Alloy Steels. *Production Engineering & Management,* v. 21, June 1948, p. 60.

Production and properties of steels being made by 12 major steel companies in a variety of compositions and with various trade names.

23b-32. Can You Use Lower Priced Alloy Steels? A. S. Jameson. *Steel,* v. 122, June 14, 1948, p. 88-92, 106.

Application possibilities of the more economical alloy compositions such as the 1300, 4000, 4100, 5000, 5100, 9200, and 9400 series.

23b-33. Ferro Fundido Para Moldes De Vidro. (Cast Iron as a Material for Glass Molds.) Lino Alfonso de Lacerda Santos. *Boletim da Associacao Brasileira de Metais,* v. 4, April 1948, p. 177-185.

Possibility of utilization of cast iron as material for glass molds. Influence of composition of the cast iron on the finished product.

23b-34. Stainless Steel Exhibit. *Welding Journal,* v. 27, July 1948, p. 562-564.

Applications and economics of the stainless steel industry.

23b-35. Welded Stainless Steel Plant. H. Seymour. *Petroleum,* v. 11, July 1948, p. 157-158.

Corrosion resistance vs. various chemicals commonly encountered in chemical-plant equipment; important applications of 18-8; classification of stainless steels; welding requirements.

23b-36. Bearing Metals; Cast Iron as Anti-Friction Material. *Automobile Engineer,* v. 38, June 1948, p. 210. Based on recent report by M. S. Karpyshev in *Vestnik Mashinostroeniya* (U.S.S.R).

It has been believed that cast iron can only be used under pressures of 285 psi., and at rubbing speeds less than 6½ ft. per sec., under shock-free conditions. Recent Russian research indicates that these limits can be exceeded if machining is precise and produces good finishes, and if design and lubrication are satisfactory.

23b-37. Welded Steel Column Assemblies Designed by Alexander Ban Replace Wood Posts in Frame Houses Are Found More Efficient in Load

Bearing, Installation and Cost. *Architectural Forum,* v. 89, July 1948, p. 115-116.

23b-38. The Growing Acceptance of Architectural Porcelain Enamel. M. J. Salton. *Finish,* v. 5, Aug. 1948, p. 29-31, 58.

Typical applications.

23b-39. New Developments in Tool Steels. Part II. George A. Roberts. *Tool & Die Journal,* v. 14, Aug. 1948, p. 48-50.

Molybdenum irons, W-Cr steel, vanadium in chromium hot work steels, and high speed steels. Table of high-speed-steel compositions. (To be continued.)

23b-40. Alloy Die Steels. L. Sanderson. *Metallurgia,* v. 38, July 1948, p. 147-152.

Dies for stampings, forgings and castings are subjected to heavy service conditions and to obtain economic production from them necessitates careful selection of the steels used in their manufacture and in their subsequent heat treatment. Steels for such and their treatment.

23b-41. Processing and Fabrication of Stainless Steel Sheet and Plate Products. Part VIII. (Continued.) I. C. Clingan and W. H. Braun. *Steel Processing,* v. 34, Aug. 1948, p. 412-415, 431.

Demonstrates the outstanding usefulness of the stainless steels. Principal uses for stainless steels in transportation, petroleum, paper, laundries, pharmaceutical, photographic, metal, cleaning and institutional equipments.

23b-42. Tool & Die Materials. Their Selection, Application and Necessary Treatment. Part I and Part II. *Steel,* v. 123, Aug. 16, 1948, p. 98-100, 102, 105; Aug. 23, 1948, p. 82-84, 86, 88, 90, 93.

Factors to be considered in the quick selection of toolsteels and carbide types to meet any given requirement. Sources, trade names and applications. Other pertinent data include chemical analyses, heat treatments, quenching media, movement in hardening and machinability as annealed.

23b-43. Special Steels for the Petroleum Industry. R. Jackson and R. J. Sarjant. *Journal of the Institute of Petroleum,* v. 34, July 1948, p. 445-485.

Effect of composition and methods of fabrication. The causes of corrosion therein encountered and methods of overcoming its effects with special reference to composition. Use of statistical methods of analysis. 28 ref.

23b-44. Precision Cast Stainless Steel Electrical Parts Reduce Weight, Save Costs. H. C. Amtsberg. *Materials & Methods,* v. 28, Sept. 1948, p. 73.

Use by Westinghouse in manufacture of circuit-breaker equipment.

23b-45. Mrs. Moo Gets a Break. *Steel Horizons,* v. 10, No. 4, [1948], p. 10-11.

Uses of stainless steel for dairy-products transportation, containers, and processing.

23b-46. Tobacco Handling Gets a Stainless Streamlining. *Steel Horizons,* v. 10, No. 4, [1948], p. 16-17.

Uses of stainless steel in tobacco processing.

23b-47 "Forever" Signs. *Steel Horizons,* v. 10, No. 4, [1948], p. 21-22.

Manufacture and applications of stainless-steel signs.

23b-48. Gas Turbine Kilowatts Are on the Way. *Steel Horizons,* v. 10, No. 4, [1948], p. 24-25.

Use of stainless and "super" alloys in G. E.'s new gas turbine for power plants.

23b-49. Nitrided-Steel Piston Rings for Engines of High Specific Power. John H. Collins, Jr., Edmond E. Bisson, and Ralph F. Schmiedlin. *National Advisory Committee for Aeronautics, Report* No. 817, 1945, 20 pages.

Several designs of nitrided steel piston rings were performance-tested under variable conditions of output. The necessity of good surface finish and conformity of the ring to the bore was indicated in the preliminary tests. The thin, nitrided steel rings were performance-tested in both nitrided and porous chromium-plated cylinders with good results.

23b-50. Cuves pour la fusion du zinc. (Crucibles for Melting of Zinc.) Gabriel Joly. *Fonderie,* July 1948, p. 1244.

Recommended compositions of metal for these crucibles.

23b-51. Selecting Materials to Reduce Maintenance. W. H. Sparr. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 134-138.

Recommendations for selection of alloys for specific uses.

23b-52. Magnetic Sheet Steel. D. Edmundson. *Engineer,* v. 186, Sept. 10, 1948, p. 269-271.

Requirements with regard to structure and properties for electrical steels. Analysis of the problem indicates that the advantages of anisotropic strip over randomly orientated material for transformer sheets are not so large as usually believed. Requirements for rotating electrical machinery, and the need for an improved magnetic permeability tester for strip.

23b-53. These Bombs Resist Destruction. *Inco Magazine,* v. 22, Fall 1948, p. 16-17.

Austenitic Cr-Ni-steel bombs used for chemical reactions in petroleum-industry research.

23b-54. Operation Without Lubricants. *Machine Design,* v. 20, Oct. 1948, p. 94.
Collins helium cryostat, an "engine" for cooling helium from −420 to −438° F. All known lubricants are solid in this range, so the piston must be operated absolutely dry. Nitrided Nitralloy, finished to close tolerances and high surface finish, is used for both piston and cylinder. Long slender stainless-steel supports are used to prevent excessive heat transfer from engine mount to piston and cylinder.

23b-55. Alloy Steel in Oil-Field Equipment. R. L. Adams. *Metal Progress,* v. 54, Oct. 1948, p. 468-470.
Types used for different pieces of equipment; history of developments.

23b-56. Alloy Steel in Oil Refineries. F. C. Braun. *Metal Progress,* v. 54, Oct. 1948, p. 471-473.
Development of suitable types for various parts and equipment.

23b-57. Alloy Steel in the Turret Lathe. Donald M. Gurney. *Metal Progress,* v. 54, Oct. 1948, p. 474-476.
Development of suitable steels for various parts.

23b-58. Low-Alloy Steels in the Electrical Industry. J. T. Rettaliata. *Metal Progress,* v. 54, Oct. 1948, p. 477-481.
Steels and their specific applications.

23b-59. Structural Alloy Steels in the Air Age. Aircraft Engines. Arthur W. F. Green. **Alloy Steels in the Airplane Itself.** L. D. Bonham. *Metal Progress,* v. 54, Oct. 1948, p. 491-496.
Development of alloy steels for aircraft engines and structures.

23b-60. Role of Alloy Steels in the Automotive Industry. William F. Sherman. *Metal Progress,* v. 54, Oct. 1948, p. 497-501.
Development of alloy steels for various automotive parts.

23b-61. Alloy Steels in Railroad Service. J. L. Carver. *Metal Progress,* v. 54, Oct. 1948, p. 502-506.
Development of alloy steels for various uses on railroads.

23b-62. Alloy Steels, the Farm Tractor, and the Full Granary. *Metal Progress,* v. 54, Oct. 1948, p. 507-510.
Muir L. Frey briefly outlines development of suitable alloy steels for agricultural tractors. Glen C. Riegel supplements Mr. Frey's remarks with some notes on two or three specific applications of alloy steels and irons in tractors. Information on hardenability control for steel castings and annealing of alloy steel. Structure and finish after conventional and isothermal anneal.

23b-63. Deep-Sea Diving Sphere Is Alloy Steel Casting. Vincent Delport. *Foundry,* v. 76, Nov. 1948 p. 153, 156.
Design and production of new "Bathysphere" for Prof. Picard. It is made of cast Cr-Mo-Ni steel. Casting, heat treatment, machining, and inspection procedures.

23b-64. How Stainless Steel Fixtures Solve Roof Drainage Problems. Richard E. Paret. *Sheet Metal Worker,* v. 39, Nov. 1948, p. 38-40, 46.
Physical characteristics, fabrication, installation, cleaning, painting, and standard forms.

23b-65. Spider Castings for Locomotive Armature Quills Withstand Severe Stresses. *Vancoram Review,* v. 5, No. 4, 1948, p. 7.
Application of Mn-Mo-V steel.

23b-66. Long Life to the Crushers. *Inco Magazine,* v. 22, no. 4, 1948, p. 9.
Use of Ni-Hard (alloy-iron containing approximately 4½% Ni and 1½% Cr) for crusher rolls.

23b-67. All-Steel Milk Trucks. *Food Industries,* v. 20, Dec. 1948, p. 116-117.

23c—Nonferrous

23c-1. Cesium Chromate Photo-Tube Pellets. H. A. Liebhafsky and A. F. Winslow. *Journal of Applied Physics,* v. 18, Dec. 1947, p. 1128-1132.
An exploratory investigation of the pellets used in the manufacture of photo tubes; hydrogen evolution or titration can be used to measure the yield of cesium with reasonable precision. Effects of substitution of Ti or Zr for Si as reducing agent (no marked advantage observed) and effects of substituting Mo for Ni in the pellet holders (use of Mo eliminated difficulty caused by formation of hydrogen by reaction of Ni with water vapor). Suggestions for further research.

23c-2. Present Trends in Nickel Alloys. *Western Metals,* v. 5, Dec. 1947, p. 43.
A review of 1947 highlights based on a report by the research and development division of International Nickel.

23c-3. Hard Materials for Rock Bits. Part II. R. W. Adamson. *Mining Congress Journal,* v. 33, Dec. 1947, p. 46-49.
The various tests used in the development of a tungsten carbide insert bit. (Concluded.)

23c-4. Additional Advantages: Compactness; Economy; Accuracy. Oscar F. Larsen. *Die Castings,* v. 6, Jan. 1948, p. 22-24, 46-47.

Uses of die castings in calculating machines.

23c-5. Design of a Combination Heater-Fan. *Die Castings,* v. 6, Jan. 1948, p. 25-26, 47-50.

How the use of thread-cutting screws and special fasteners for rapid assembly has been made practical by use of zinc-base die castings.

23c-6. Fire Feeder. L. B. Harrington. *Die Castings,* v. 6, Jan. 1948, p. 29-30, 51-54.

Redesign of pump for fuel oil for use in domestic and other space-heating units, from iron castings to die castings.

23c-7. Minerals for Chemical and Allied Industries: A Review of Sources, Uses and Specifications—Part XV. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 23, Dec. 1947, p. 794-800.

Nickel and its uses. (To be continued.)

23c-8. Some Photo-Electric Thresholds for Geiger-Muller Counters With Evaporated Cathodes. C. A. Ramm. *Journal of Scientific Instruments,* v. 24, Dec. 1947, p. 320-321.

Measurements with several cathode metals to determine the influence on the photo-electric thresholds of Geiger-Muller counters. Gold has desirable properties for counters with evaporated cathodes.

23c-9. Copper on Large Housing Project. *Sheet Metal Worker,* v. 39, Jan. 1948, p. 101-102.

Varied architectural applications.

23c-10. Uses for Tantalum and Columbium. T. A. Hood. *Munitions Supply Laboratories, Commonwealth of Australia. Information Circular* 11, Sept. 1947, 18 pages.

A brief review followed by a classified list of uses and a selected bibliography. 35 ref.

23c-11. The Application of Sintered Carbides in Industry. H. Eckersley. *Engineers' Digest* (American Edition), v. 5, Jan. 1948, p. 22-25. Condensed from *Journal of The Institution of Production Engineers,* v. 26, Oct. 1947, p. 358-377.

23c-12. Present Trends in Nickel Alloys. *Petroleum Engineer,* v. 19, Jan. 1948, p. 106, 108.

23c-13. Carbide Guide-Rest Gives Eight-Fold Increase in Service Life. *Modern Industrial Press,* v. 10, Jan. 1948, p. 8.

Effects of replacement of cast-iron guide-rest in a circular die-roll threader.

23c-14. Why Use Copper Alloys? Malcolm A. Buell. *Canadian Metals & Metallurgical Industries,* v. 11, Jan. 1948, p. 26, 37.

23c-15. Decorative Uses of Copper and Brass. *Copper & Brass Bulletin,* Feb. 1948, p. 1-15.

23c-16. The Application of Hard Materials for Rock Cutting Bits. R. W. Adamson. *Mines Magazine,* v. 38, Jan. 1948, p. 24-28.

Includes a discussion of design, selection, and properties. (To be continued.) (Presented at Annual Metal Mining Convention, El Paso, Texas, Oct. 27, 1947.)

23c-17. That "New Look". *Die Castings,* v. 6, Feb. 1948, p. 35, 51.

Application of aluminum die castings to motor-driven knife sharpener and of nickel-aluminum die castings to a rotating nut sheller.

23c-18. Sulphuric Resistant Stainless Steel Now Available in Wrought Forms. *Modern Machine Shop,* v. 20, Feb. 1948, p. 170, 172, 174, 176.

Characteristics of above.

23c-19. Carbide Tool Routs Fiberglas. *American Machinist,* v. 92, Feb. 26, 1948, p. 83.

Satisfactory bits were finally made by cementing a 21/64-in. diameter solid piece of carbide into a 1/2-in. steel shank and grinding the flute into the carbide. Kennametal K4H, a W-Ti carbide with a low percentage of Co binder, proved to have the required wear resistance to stand the abrasiveness of Fiberglas. One bit, for instance, has had a tool life of over 500 linear ft. on four layers of 1/16-in. material, and should be good for at least 300 ft. more before resharpening.

23c-20. A Mark of Distinction. *Die Castings,* v. 6, March 1948, p. 23-24.

Use of Zn and Al die castings for pantograph-type engraving machines.

23c-21. Safety in Numbers. Hiram K. Barton. *Die Castings,* v. 6, March 1948, p. 25, 47-49.

Use of Zn die castings for new type of lock using a code system making possible use of a single type of lock for all purposes with a single key for all the locks, irrespective of their differing purposes.

23c-22. The Use of Decorative Parts in Product Styling. *Die Castings,* v. 6, March 1948, p. 26-28, 45-46.

Use of Zn die castings for miscellaneous products such as refrigerators, stoves, washing machines, and deepfreeze units.

23c-23. Design of an Electric Iron. Maxwell C. Maxwell. *Die Castings,* v.

6, March 1948, p. 31-32, 49-50.

Use of die-cast Al sole plates with tubular Ni-Cr heating elements in new iron with hinged toe section.

23c-24. A New Material for Drill Bits. *Engineering and Mining Journal,* v. 149, March 1948, p. 73.

New patented composition developed in England and said to be hard as tungsten, tough as steel, and unbreakable. It is known as "Carbometal" and a patent claim reads as follows: "An abrasive or cutting tool—comprising a body formed of diamond particles bonded together by a bond which functions as a secondary abrasive and consists of a mixture of boron carbide, silicon carbide, and at least one metallic carbide".

23c-25. The Application of Hard Materials for Rock Cutting Bits. (Concluded.) R. W. Adamson. *Mines Magazine,* v. 38, Feb. 1948, p. 19-20.

23c-26. Finding and Fighting Marine Borers. Part III—Metal Armor and Concrete Jacketing. Robert D. Chellis. *Engineering News-Record,* v. 140, April 1, 1948, p. 73-76.

Methods for protecting timber.

23c-27. Modern Uses of Hard Metal. H. Burden. *Alloy Metals Review,* v. 5, March 1948, p. 2-11.

An effort is made to classify the various grades according to composition and properties, and to show how they can be applied with advantage.

23c-28. Uses of the Rarer Metals. *Canadian Metals & Metallurgical Industries,* v. 11, March 1948, p. 13.

Some new developments.

23c-29. Performance of Cemented Carbides. *Machinery* (London), v. 72, March 25, 1948, p. 401.

Some interesting performance examples quoted by G. J. Trapp in a paper read recently before the Manchester Association of Engineers.

23c-30. Novel Uses for Tungsten Carbide. H. Sanders. *Machinery Lloyd* (Overseas Edition), v. 20, March 27, 1948, p. 75-77.

Some more recent and novel applications. These include use for rolls, for dies, for burnishing balls, for files, for valves and seats, for tools, for milling cutters, and other applications.

23c-31. Die Castings in the G. E. Magnetic Tracer Control. T. R. Tappan. *Die Castings,* v. 6, April 1948, p. 33-34, 54-55.

Simplified assembly of new magnetic tracing head by use of magnetic laminations as inserts in Zn and Al die castings.

23c-32. The Housing Problem. *Die Casting,* v. 6, May 1948, p. 27, 44.

Use of die castings for the housings of many small products.

23c-33. Here's a Tip. *Die Castings,* v. 6, May 1948, p. 37, 54-55.

Use of Zn die castings for small hardware specialties produced in large volume.

23c-34. Clean-Cut. V. G. Biro. *Die Castings,* v. 6, May 1948, p. 41-43.

Food-catching crevices have been eliminated in meat-and-bone cutting machine by use of die castings.

23c-35. Titanium Takes New Importance. Otto Herres. *Mines Magazine,* v. 38, April 1948, p. 19-20, 24.

Uses as metal and as oxide.

23c-36. Silver and the Platinum Group Metals in German Chemical Industry. J. M. Pirie. *Industrial Chemist and Chemical Manufacturer,* v. 24, April 1948, p. 231-239.

Uses as catalysts and as materials of construction.

23c-37. Modern Uses of Hard Metals. H. Burden. *Metallurgia,* v. 38, May 1948, p. 27-33. Reprinted from *Alloy Metals Review.*

23c-38. Die Castings in the '48 Packard. Herbert Chase, *Iron Age,* v. 161, June 3, 1948, p. 78-81.

As many as 80 die-cast parts, having a total weight of 61 lb., are used in some models.

23c-39. Beryllium in Industry. H. Manley. *Mine & Quarry Engineering,* v. 14, June 1948, p. 183-190.

Historical aspects, properties of Be and Be-Cu, and applications.

23c-40. Planned for Viewing. *Die Castings,* v. 6, June 1948, p. 37-39.

Use of Zn die castings in slide projector.

23c-41. Die Castings in the Design of Vending Machines; Get It While It's Hot. *Die Castings,* v. 6, June 1948, p. 40-43.

Chromium plated worm gears with integral pinions are among the many special gear forms attained by die casting the cup-feed mechanism of hot-coffee vendor. Power transmission elements contain many die-cast zinc components.

23-42. Carbide Inserts Rejuvenate Plastic Transfer Molds. A. L. Pranses. *American Machinist,* v. 92, June 17, 1948, p. 95.

How wear at gates and vents of transfer molds for thermosetting plastics can be minimized by use of

carbide blocks inserted at critical points.

23c-43. On the Up and Up. A. Arditti. *Die Castings,* v. 6, July 1948, p. 28-30, 49-50.

Various parts of small portable hoisting unit being redesigned for maximum use of die-cast aluminum and zinc.

23c-44. All for Fun. *Die Castings,* v. 6, July 1948, p. 35-37.

Construction kit with which a 12-year-old child can build any of four different styles of toy automobiles, using zinc die castings and molded plastic parts.

23c-45. The French Die Casting Industry in 1948. H. K. Barton and L. C. Barton. *Machinery (London),* v. 72, June 24, 1948, p. 769-772.

Die-cast parts and products exhibited at the 1948 Paris Trade Fair.

23c-46. Alloys for Glass-to-Metal Seals. John H. Crede. *Steel Horizons,* v. 10, no. 3, 1948, p. 14-16.

Properties and applicabilities of alloys made by Allegheny Ludlum Steel Corp.

23c-47. Copper and Copper-Base Allovs in Communications. *Copper & Brass Bulletin,* no. 145, Aug. 1948, p. 1-16.

Use of copper, brass and bronze in telephones, mobile phones, television, radio, telegraphy, and railway signal.

23c-48. The Production of Thin Be Foils. Hugh Bradner. *U. S. Atomic Energy Commission,* AECD-1949, March 18, 1948, 4 pages.

A procedure for making beryllium foils between 10^{-5} and 10^{-3} cm. thick, and with diameters up to 1½ in., and methods of mounting them.

23c-49. Stellite in the Mining Industry. B. G. MacKenzie. *Canadian Mining Journal,* v. 69, Aug. 1948, p. 71-74.

Development of alloy and application in design and use of tools.

23c-50. Quick on the Trigger. L. E. Parker. *Die Castings,* v. 6, Sept. 1948, p. 27-28, 71-73.

Use of aluminum and zinc die castings in portable hand drill.

23c-51. Die Castings in Special Machines; Automatic Printing Presses. *Die Castings,* v. 6, Sept. 1948, p. 36-38, 59-60.

Various applications of aluminum and zinc die castings to printing presses.

23c-52. Die wirtschaftliche Herstellung von doppelseitig begossenen Stahl-Bleibronze-Lagern. (Commercial Production of Bearings Consisting of Steel With Lead-Bronze Shells Cast on Both the Inside and the Outside Surfaces.) B. Garre. *Archiv fur Metallkunde,* v. 1, Sept. 1947, p. 422-423.

23c-53. Connector Provides High Safety. Charles J. Adams. *Aviation Week,* v. 49, Sept. 27, 1948, p. 28-29.

Use of a Cu-Ni-Te alloy for electrical contacts in airplane safety devices. These contacts still function after 30-min. exposure to 2100° F. flame behind a stainless-steel firewall.

23c-54. Large Cemented Carbide Sections Gain Wide Industrial Use. Harry Crump. *Steel,* v. 123, Sept. 27, 1948, p. 103, 106.

New manufacturing techniques and modified metal mixtures show material to be economically sound for many jobs in addition to tool tips. Weight limit per piece that can be produced commercially on present equipment is 100 to 120 lbs. Used for rolls for rolling extremely thin sheet steel; brick-mold liners; forming and drawing-die nibs; broach blocks and broaches; boring bars; chilling and quench blocks for tempering razor-blade stock; and miscellaneous other jobs.

23c-55. Die Bedeutung der Spurenelemente in der modernen Forschung und Technik. (The Importance of Trace Elements in Modern Research and Industry.) Herbert Haberlandt. *Mittelungen des Chemischen Forschungsinstitutas der Industrie Osterreichs,* v. 2, July 1948, p. 56-59.

Specific uses of Cd, Be, Ga, Ge, Ce, Nd, In, Th, Ti, V, Mo, W, Li, Sb, and Bi.

23c-56 Hard Metal Carbides Prove Their Versatility. J. S. Gillespie. *Machine and Tool Blue Book,* v. 44, Oct. 1948, p. 137-138, 140, 142, 144, 146, 148, 150, 152-154.

Various applications to machine tools, metal working, and hand tools.

23c-57. The Practical Weigh. *Die Castings,* v. 6, Oct. 1948, p. 25-27, 60-64.

Design improvements in die-cast parts for Toledo scales, and over-all design of new food-weighing scale.

23c-58. Fittings Galore. *Die Castings,* v. 6, Oct. 1948, p. 30-32, 67-68.

Advantages of die casting for electrical fittings and parts. Zn, Al, Sn, Pb, and Cu base alloys are all used.

23c-59. Milling Cutters With Zinc Alloy Cast Body. A. B. Frenkel. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 360. Translated and abstracted from *Stanki i Instrument* (Tools and Instruments), No. 2, 1948, p. 23.

Found to be more satisfactory and

cheaper than cast-steel bodies normally used. Manufacture is much simpler, no machining or heat treatment being necessary after casting. The body is die cast under pressure. Composition is 4.75% Al, 0.07% Mg, 0.08% Cu, 0.01% Pb, 0.05% Fe, remainder Zn.

23c-60. Experience Picks a Roof. *Inco Magazine,* v. 22, Fall 1948, p. 11-12.
Use of monel roofing on two buildings of Pittsburgh Plate Glass Co.'s Natrium, W. Va. plant. This alloy successfully resists the severe corrosion conditions present.

23c-61. Novel Design Adds to Valve Life. *Inco Magazine,* v. 22, Fall 1948, p. 13.
Jenkins gate valve has monel seat rings. Wedges can be replaced whenever worn.

23c-62. A Precious Metal of Many Uses. *Inco Magazine,* v. 22, Fall 1948, p. 22-24.
Rhodium has high value as an electrodeposited finish because of its appearance, resistance to wear and corrosion, and exceptional brightness. Properties and methods.

23c-63. Rhenium; Recent Developments and Possible Applications. J. G. F. Druce. *Industrial Chemist and Chemical Manufacturer,* v. 24, Oct. 1948, p. 683-684.
10 ref.

23c-64. Use of Monel in Iron and Steel Pickling Equipment. *Iron Age,* v. 162, Oct. 21, 1948, p. 82. From a technical bulletin of International Nickel Co.
Conclusions based on plant experience.

23c-65. The Design, Construction and Maintenance of Burning Tool Equipment. A. Rasmussen. *Finish,* v. 5, Nov. 1948, p. 43-44. A condensation.
Use of special Ni-Cr-Fe alloys in construction of tools and fixtures for carrying pieces during the enameling process.

23c-66. Galvanized Nails Help Maintain Life and Beauty of Roofing and Siding. *Paint Progress,* v. 7, no. 3, [1948], p. 8-9.
Comparative results obtained with galvanized and ordinary nails. The latter cause unsightly siding stains and disintegrate through corrosion.

23c-67. When You Consider Using Aluminum Wire and Cable. G. A. Van Brunt. *Factory Management and Maintenance,* v. 106, Nov. 1948, p. 126-128.
Comparative properties and factors to be considered in choosing between copper and aluminum as electrical conductors.

23c-68. Sound Styling. *Die Castings,* v. 6, Nov. 1948, p. 23-24, 61-62.
Use of die-cast zinc grille and fittings for portable radio.

23c-69. And Now — Television. *Die Castings,* v. 6, Nov. 1948, p. 33-35, 65.
Various uses of Zn and Al die castings in television sets.

23c-70. Paris Fashions. H. K. Barton. *Die Castings,* v. 6, Nov. 1948, p. 36-38, 66-67.
Miscellaneous die-cast products exhibited at the Paris Trade Fair this year.

23c-71. The Noble Metals Find Increasingly Wide Use in Industry. F. E. Carter. *Materials & Methods,* v. 28, Nov. 1948, p. 55-59.
Miscellaneous applications and useful properties.

23c-72. Palladium Leaf; A New Metal in Book Decoration. E. C. Rhodes. *British Printer,* v. 61, Nov.-Dec. 1948, p. 30-31.

23c-73. 'Twas the Sale Before Christmas. *Die Castings,* v. 6, Dec. 1948, p. 25-30, 64-66.
Series of articles on applications of Zn and Al die castings to toy manufacture: Famous Model Trucks; Pick up and Carry; Toy Lumber Carriers; Motorized Construction; and Fire Engines.

23c-74. From Knights to Airplanes. *Die Castings,* v. 6, Dec. 1948, p. 32, 34, 68-70.
Novelty die-cast cigarette lighters which resemble planes, cannons, knights in armor, etc. Production methods.

23c-75. A Point Well Made. *Die Castings,* v. 6, Dec. 1948, p. 37, 61-63.
Pencil sharpener with Zn die-cast housing and chromium plated plus enameled surface. How redesign effected savings.

23c-76. Money in the Bank. *Die Castings,* v. 6, Dec. 1948, p. 38-40, 71-73.
Novelty die-cast coin banks in Zn or Al.

23c-77. Modern Industry Makes Important Uses of an Ancient Alloy. *Inco Magazine,* v. 22, no. 4, 1948, p. 11-13.
Applications of bronzes containing nickel.

23c-78. They Do More Than Protect Health. *Inco Magazine,* v. 22, no. 4, 1948, p. 18-19, 28-29.
Uses of nickel and nickel alloys in a variety of types of commercial sterilizers.

23c-79. Zirconium and Thorium Electrodes in Discharge Lamps. H. C. Rent-

schler, D. E. Henry, and W. C. Lilliendahl. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 299-305; discussion, p. 305-308.

Previously abstracted from preprint. See item 23-125.

23c-80. Some Applications of Tantalum in Electronics. L. F. Yntema and R. W. Yancey. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 319-322; discussion, p. 322-324.

23d—Light Metals

23d-1. Three Exhibitions Reported. *Light Metals,* v. 10, Dec. 1947, p. 612-621, 623-628.

Numerous applications of the light metals, shown at exhibitions of the building, dairy, and brewing industries in Britain.

23d-2. Simplifying Bodywork Construction and Assembly. *Light Metals,* v. 10, Dec. 1947, p. 629-633.

A simplified system of prefabricated cab and bodywork construction. In addition to sheet and extruded sections of aluminum alloy, castings are also used in the standard assemblies.

23d-3. Ten Years' Hard! *Light Metals,* v. 10, Dec. 1947, p. 646-650.

Results of ten years' service of about 350 trucks equipped with aluminum alloy bodies and cabs.

23d-4. Aluminum Stretches Steel Supply for Cars—1948. James R. Custer. *Automotive Industries,* v. 98, Jan. 1, 1948, p. 29, 58.

Substitution of aluminum for steel.

23d-5. Ford 100-Hp Truck Engine Modified to Give 175 Hp. *Automotive Industries,* v. 98, Jan. 1, 1948, p. 46, 84.

Main components consist of cast aluminum alloy heads; dual carburetors; aluminum manifolding and induction system; radially inclined, overhead, intake and exhaust valves with dual valve springs, rocker arms and push rods; aluminum valve cover; and extension pipes fitted around the spark plugs to protect them from valve-gear lubricating oil.

23d-6. Synagogue Reroofed With Aluminum. *Sheet Metal Worker,* v. 38, Dec. 1947, p. 55.

Recommended phosphating and coating techniques included.

23d-7. Experiences With Aluminum Electrical Conductors in Aircraft. B. M. G. Wolfframm. *Technical Data Digest,* v. 13, Jan. 1, 1948, p. 7-13.

Although, in general, the material situation in Germany did not permit the use of aluminum cables, the development of terminals had progressed so far that no technical difficulties were expected. Corrosion could be avoided by use of bimetallic sleeves.

23d-8. Aluminum Permanent Mold Castings. E. G. Fahlman. *Light Metal Age,* v. 5, Dec. 1947, p. 6-12.

Advantages, applications, and trends. Suggestions for design and selection of alloys.

23d-9. All Metal Finishes for Commercial Plants. Stephen Porter Lathrop. *Light Metal Age,* v. 5, Dec. 1947, p. 21.

Use in baking plant of "Renolite", which consists of plywood faced with sheet aluminum.

23d-10. Magnesium Bows and Landing Nets. P. V. Leivo. *Modern Metals,* v. 3, Dec. 1947, p. 19.

New applications in archery and fishing.

23d-11. From Cow Barn to 5th Avenue. *Modern Metals,* v. 3, Dec. 1947, p. 20-21.

Lawn and garden furniture and decorative items of cast aluminum being made in a barn.

23d-12. Heavy-Duty Light Alloy Engines. *Modern Metals,* v. 3, Dec. 1947, p. 22-23.

Production and design of 10-hp., 4-cycle, air-cooled engines for refrigeration compressors.

23d-13. Self-Priming Aluminum Centrifugal Pumps. *Modern Metals,* v. 3, Dec. 1947, p. 24-25.

Features of the Marlow pump and reasons for utilization of aluminum in its construction.

23d-14. Sew Efficient. H. K. Barton. *Die Castings,* v. 6, Jan. 1948, p. 21, 44-45.

Use of aluminum-alloy die castings in the housing of Swiss sewing machine.

23d-15. No Mistake. *Die Castings,* v. 6, Jan. 1948, p. 31, 54.

Use of aluminum die castings for electric erasing machine.

23d-16. Recent Developments in the Uses of Aluminum. G. R. Black. *Canadian Metals & Metallurgical Industries,* v. 10, Dec. 1947, p. 16-19.

23d-17. Light Alloys in the Internal-Combustion Engine. *Light Metals,* v. 10, Dec. 1947, p. 651-659.

The value of aluminum alloys for cylinder heads; problems connected with the use of steel studs and bolts; fuel savings. (To be continued.)

23d-18. Wire Products in Light Alloy. *Light Metals,* v. 11, Jan. 1948, p. 23-32.

Many new applications of aluminum in wire products.

23d-19. Light Alloy in Rectifiers, Photocells and Condensers. (Continued). *Light Metals,* v. 11, Jan. 1948, p. 33-41.

Compares the production of component containers of plastic, steel, brass, copper, and aluminum and introduces the subject of material specifications.

23d-20. Light Alloys in the Internal Combustion Engine. (Continued.) *Light Metals,* v. 11, Jan. 1948, p. 49-56.

Problems involved in the provision of screwed threads; cylinders and cylinder blocks. (To be cont.)

23d-21. Report on the Use of Elektron Inserts in Synthetic Resin Moldings. C. J. Bushrod. *Magnesium Review and Abstracts,* v. 7, Jan. 1947, p. 18-22.

Cracking and corrosion tests on composite moldings of phenolformaldehyde and cellulose acetate resins containing Elektron (a magnesium alloy) inserts. Good results were obtained.

23d-22. Aluminum Developments in 1947. E. G. West. *Metallurgia,* v. 37, Dec. 1947, p. 91-94.

Concerned mainly with new applications.

23d-23. How to Use Aluminum Roofing Effectively. *Engineering News-Record,* v. 140, Jan. 22, 1948, p. 78-79.

Installation recommendations.

23d-24. Textile Mill Walls Faced With Aluminum. John W. Davis. *Engineering News-Record,* v. 140. Jan. 22, 1948, p. 90-91.

Walls are faced on the exterior with 16-gage aluminum sheets. The roof deck is composed of light-gage steel panels.

23d-25. Magnesium Castings; Production and Use. A. W. Winston and M. E. Brooks. *American Foundryman,* v. 13, Jan. 1948, p. 30-36.

Various applications; methods of production; properties; design factors. (Presented at the Annual Meeting of A.S.M.E., Atlantic City, N. J., Dec. 1-5, 1947.)

23d-26. German Research on Experimental Aluminum-Base Bearings. *British Intelligence Objectives Sub-Committee, FIAT Final Report* No. 805, April 23, 1946, 7 pages.

Production and properties of aluminum base bearings containing Pb and Cd.

23d-27. Beryllium Products. *Industrial Diamond Review,* v. 8, Jan. 1948, p. 20. Abstracted from B.I.O.S. Final Report No. 550, Item No. 21, **Investigation of Beryllium Production in Germany and Italy Including Production and Uses of Oxides and Alloys.** H. M. Stat. Off., London, 1947.

23d-28. Light Cartographic Camera. *Modern Metals,* v. 3, Jan. 1948, p. 22-23.

Uses of aluminum in Fairchild aerial-mapping camera.

23d-29. Aluminum Approved for Air Ducts. *Modern Metals,* v. 3, Jan. 1948, p. 23.

New FHA-approved specifications for air ducts.

23d-30. Reynolds Broadening Aluminum Markets. *Modern Metals,* v. 3, Jan. 1948, p. 30-32.

Numerous new applications introduced or promoted by Reynolds Metals.

23d-31. The Use of Magnesium as a Construction Material in Germany During World War II. Part I. Hubert Altwicker and Ernst Josef deRidder. *Modern Metals,* v. 3, Jan. 1948, p. 15-19.

The state and development of magnesium production in Germany since 1939; the attitude of industry toward the introduction of magnesium; applications of magnesium during the war. (To be continued.)

23d-32. Pressed Metal Opportunities for Light Metals. *Light Metal Age,* v. 6, Feb. 1948, p. 12-15.

23d-33. I. C. Builds Five Aluminum Hopper Cars. *Railway Mechanical Engineer,* v. 122, Feb. 1948, p. 90-92.

Described and illustrated. Table gives approximate comparable weights of aluminum and steel parts used.

23d-34. Note sui Cavi in Alluminio. (Note on Aluminum Cables.) U. Benoffi. *Alluminio,* v. 16, Nov-Dec. 1947, p. 503-507.

The substitution of aluminum for copper in overhead and underground cables and properties of the two metals.

23d-35. Special Alloys Featured at San Francisco Foundry. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 102-103.

Use of Frontier 40-E, an aluminum casting alloy containing Zn, Fe, Mg, Cr, and Ti. The alloy is intended for high-strength aluminum castings which do not require the usual heat treating procedures to attain maximum physical properties. Other properties claimed are exceptional strength, shock resistance, machinability, corrosion resistance, and pressure tightness. Also mentions use of other special alloys at Pacific Brass.

23d-36. Aluminum Alloy Wheels Reduce Trailer Weight. *Automotive Industries,* v. 98, Feb. 15, 1948, p. 45.

23d-37. Neoprene-Washered Nails for Fastening Aluminum Roofing and Siding. *Sheet Metal Worker,* v. 39, Feb. 1948, p. 66-68.

New development. Helpful advice on successful erection of aluminum roofing and siding.

23d-38. Large Aluminum Roofing Installation. *Modern Metals,* v. 4, Feb. 1948, p. 14-15.

Reroofing of Salt Lake City's 84-year-old Mormon Tabernacle with sheet aluminum.

23d-39. Aluminum for Farm Equipment. *Modern Metals,* v. 4, Feb. 1948, p. 19.

23d-40. The Use of Magnesium as a Construction Material in Germany During World War II. Part II. Hubert Altwicker and Ernst Josef deRidder. *Modern Metals,* v. 4, Feb. 1948, p. 20-24.

Some typical die-casting applications and forgings as well as the use of magnesium by the German army. (To be continued.)

23d-41. Aluminum Trim, Channel and Weather Strip. *Modern Metals,* v. 4, Feb. 1948, p. 26.

New matching series of aluminum metal trims recently introduced.

23d-42. Paris Agricultural Exhibition. *Modern Metals,* v. 4, Feb. 1948, p. 30-32. Translated from *Revue d'Aluminium.*

Varied applications of aluminum in French farm machinery.

23d-43. Light Metals in Automotive Construction. Clay P. Bedford. *Steel,* v. 122, March 15, 1948, p. 102, 104, 106.

Progress made by Kaiser-Frazer in adopting Al and Mg for important auto components.

23d-44. Light Alloys in the Internal Combustion Engine. (Continued.) *Light Metals,* v. 11, Feb. 1948, p. 72-76.

Application of light alloys to crankcases and sumps for all types of engines; light alloy bearings. (To be continued.)

23d-45. Light Alloy Commercial Coachwork. L. Graham Davies. *Light Metals,* v. 11, Feb. 1948, p. 84-88.

British application.

23d-46. Aluminum Piping—Where and Why It's Used. C. B. McLaughlin. *Heating, Piping & Air Conditioning,* v. 20, March 1948, p. 87-89.

Why Al alloys are important piping materials for many industrial applications. Noteworthy properties and design precautions with respect to galvanic action, flexibility, insulation, gaskets, hangers, and supports.

23d-47. Aluminum Plowshares. *Industrial and Engineering Chemistry,* v. 40, March 1948, p. 10A, 12A.

Important new applications.

23d-48. Aluminum—What's It Good For? Roy A. Hunt. *Western Metals,* v. 6, Feb. 1948, p. 19-25.

Miscellaneous uses, especially those which were new in 1947.

23d-49. Eyes Front. *Die Castings,* v. 6, March 1948, p. 34.

Built entirely without rivets, diecast Al eye-glass frames are said to be sturdier than plastic ones.

23d-50. Les Métaux de Remplacement du Cuivre dans la Construction des Lignes de Contact Pour Tramways et Trolleybus. (Replacement Metals for Copper in Construction of Contact Cables for Street Cars and Trolley Buses.) Louis Albert. *Revue de l'Aluminium,* v. 25, Jan. 1948, p. 3-12.

Results of tests of substitutes for Cu in trolley wires. Almelec (Fe, up to 0.35%; Si, 0.6 $\pm$ 0.1%; Mg, 0.7 $\pm$ 0.1%; and Al, balance); steel combinations; and other alloys were used. Wear test data are given and it is indicated that such replacement is possible and is economically sound.

23d-51. L'Aluminium aux de l'Emballage et de l'Emouteillage. (Aluminum at the Packing and Bottling Show.) Pierre Prevot. *Revue de l'Aluminium,* v. 25, Jan. 1948, p. 21-32.

Numerous applications as shown at the exhibition.

23d-52. Aluminum Cans a Clean Bill! *Light Metals,* v. 11, March 1948, p. 115-119.

A few months ago the British Ministry of food issued a circular which stated: "Applications [for import licenses] for goods packed in other than tinplate will not be supported". This is a particularly severe blow to the Norwegian canning industry which uses aluminum cans extensively. Presents data and arguments to prove that, as a container material for food products, aluminum is just as good as tinplate, and in some cases, even to be preferred.

23d-53. Aluminum Foil. Part II. Structure of Foil Packages. Quantitative Data on the Efficiency of Various Types of Closures in Excluding Moisture; Mechanical Strength of Heat-Sealed Joints; Moisture-Excluding Efficiencies of Bags and Cartons; Cooling Rates of Cartons With and Without Boil Liners. Junius D. Edwards and D. B. Strohm. *Modern Packaging,* v. 21, March 1948, p. 150-153, 188-189.

23d-54. What About Magnesium Plates? Recent Tests Seem to Add Up Their Good Points. Sam A. Cousley. *Printing Magazine,* v. 72, March 1948, p. 48-49.

23d-55. The Base is Basic Uni-Base. W. G. Clingman, Jr. *Photo-Engravers Bulletin,* v. 37, March 1948, p. 13-18.

"Uni-Base" is magnesium used in

place of wood as a mounting material in engraving, electrotyping, and printing. Its properties, processing, and advantages.

23d-56. Light Alloy Developments at Kaiser-Frazer. Clay P. Bedford. *Modern Metals,* v. 4, March 1948, p. 17-19.

Some of the uses presently being developed, including die-cast Al doors, sheet-Al gas tanks, die-cast Mg wheels, and several other applications still in the early stages.

23d-57. Magnesium Castings for the Allison Turbo-Jet Engine. J. Walraven. *Modern Metals,* v. 4, March 1948, p. 20-22.

Mg-casting applications for the engine which is being used in the P-80 Shooting Star. General magnesium foundry practice, heat-treating procedure, and several new developments.

23d-58. New Automatic Washer. *Modern Metals,* v. 4, March 1948, p. 24-25.

"Coronado" washer utilizes aluminum throughout.

23d-59. Magnesium in Germany During World War II. Part III. Hubert Altwicker. *Modern Metals,* v. 4, March 1948, p. 26-30.

Use of magnesium for grenades, mines, flame throwers, machine-gun parts, field hospitals, paratroop equipment, welding practice, and woven and spun wire goods.

23d-60. German Automobile Firm Utilizes Magnesium. *Modern Metals,* v. 4, March 1948, p. 30.

Experience of Opel Co., Russelsheim.

23d-61. Cast Electrical Hardware for High Tension Lines. *Modern Metals,* v. 4, March 1948, p. 36.

Use of aluminum hardware.

23d-62. Magnesium Industrial Doors. J. Mezoff. *Modern Metals,* v. 4, March 1948, p. 38.

Advantages.

23d-63. Eighty-Pound Piano. *Modern Metals,* v. 4, March 1948, p. 40.

Lightweight piano utilizes magnesium and plastics.

23d-64. Aluminum in Freight-Car Construction. R. B. Boruck and E. A. Sipp. *Railway Age,* v. 124, March 27, 1948, p. 38-41; also *Railway Mechanical Engineer,* v. 122, April 1948, p. 72-75. A condensation.

How much aluminum is used? What weight saving is attained? These questions are discussed in relation to 50-ton box and 50-and 70-ton hopper cars. (Presented at annual meeting, A.S.M.E., Atlantic City, Dec. 4, 1947.)

23d-65. Aluminum and Its Alloys. *Metallurgia,* v. 37, Feb. 1948, p. 185-186, 194.

New alloys, fabrication processes and applications.

23d-66. Light Alloy Piston Materials. A. Schofield and L. M. Wyatt. *Metallurgia,* v. 37, Feb. 1948, p. 187-194.

Compositions, properties, and structures of typical commercial piston alloys. Temperature distributions in different types of pistons in connection with design and with selection of alloys. Compositions of commercial alloys and attempt to show relationships among basically similar British, U. S., and German alloys.

23d-67. Light Alloys in the Internal-Combustion Engine. (Continued.) *Light Metals,* v. 11, March 1948, p. 145-152.

Light-alloy bearings and the possible application of light alloys to crankshafts and camshafts. Use of powdered metals. (To be concluded.)

23d-68. Will We Follow Europe in the Use of Aluminum Cans? John V. Ziemba. *Food Industries,* v. 20, April 1948, p. 94-95, 228, 230.

Technical and economic factors involved. Although Norway is using aluminum cans in quantity, their adoption in the U. S. is being held back by cost differentials and other factors.

23d-69. Full Measure Obtained. *Die Castings,* v. 6, April 1948, p. 25-26, 57.

Use of die-cast Al housing and valve plate for gas meters.

23d-70. For the Record. *Die Castings,* v. 6, April 1948, p. 27-29, 45-48.

Use of more than 50 die-cast Al parts in the Recordak Microfilmer. Savings in machining made possible by die casting.

23d-71. Efficient Operation. *Die Castings,* v. 6, April 1948, p. 30, 55.

Savings made possible by redesign of two small parts for Al-alloy die casting.

23d-72. Die Castings—Structural Members in Automobiles? *Die Castings,* v. 6, April 1948, p. 39-40.

Development work on light-metal die castings for auto wheels, doors, and instrument panels. (Based on address by Clay Bedford before Cleveland Chapter, A.S.T.E., Feb. 13, 1948,)

23d-73. Magnesium Die Castings; A Progress Report. *Die Castings,* v. 6, April 1948, p. 42-45.

Products now being constructed of magnesium die castings. Outlines factors to be considered in deciding

whether or not to use Mg die castings for a specific job.

23d-74. Some Cost Comparisons. Karl F. Theobold. *Die Castings,* v. 6, April 1948, p. 41, 56-57.

Comparative costs for two parts used in aviation ground trainers manufactured for the Army and Navy, using Zn die castings or machining.

23d-75. Where Aluminum Replaces Steel in Ford and Mercury Cars. *Automotive Industries,* v. 98, April 15, 1948, p. 42-43, 67.

23d-76. Alcoa Davenport Mill Big Aluminum User. *Modern Metals,* v. 4, April 1948, p. 21.

Largest single application of aluminum to date in the building trades. More than 6,250,000 lb. of aluminum is used in the construction of its nearly completed Davenport, Iowa, sheet-and-plate rolling mill.

23d-77. The Quartermaster Corps Designs for Magnesium. J. W. Millard. *Modern Metals,* v. 4, April 1948, p. 22-25.

Seven reasons why the Quartermaster Corps is interested in magnesium and typical examples of applications being developed.

23d-78. Aluminum Cans. D. Nickelsen. *Modern Packaging,* v. 21, April 1948, p. 134-137, 274, 276.

Use of the above for food packaging in Norway. Advantages and limitations, and storage life for various foods as determined by experiment. Use of surface protection to prevent corrosion is required for certain types of food.

23d-79. Freight Car Construction. R. B. Borucki and E. A. Sipp. *American Society of Mechanical Engineers, Paper* No. 47-A-79 (Advance Copy), 1947, 12 pages.

Previously abstracted from condensed version in *Railway Age,* v. 124, March 27, 1948, p. 38-41; *Railway Mechanical Engineer,* v. 122, April 1948, p. 72-75. See item 23d-64, 1948.

23d-80. Freight Car Construction. Gilbert B. Hauser. *American Society of Mechanical Engineers, Paper No.* 47-A-89 (Advance Copy), 1947, 8 pages.

Advantages of aluminum.

23d-81. Aluminum School Buildings. *Light Metals,* v. 11, April 1948, p. 174-179.

23d-82. Light Alloys in the Internal-Combustion Engine. (Concluded.) *Light Metals,* v. 11, April 1948, p. 181-187, 189-191.

Use of light alloys for crankshafts and camshafts, connecting rods, superchargers, exhaust and silencing systems, and miscellaneous components. 24 ref.

23d-83. Magnesium in France. *Light Metals,* v. 11, April 1948, p. 192-198.

Surveys current French production and use of Mg alloys.

23d-84. Ideal Home Exhibition—1948. *Light Metals,* v. 11, April 1948, p. 204-211.

Home furniture and accessories utilizing aluminum to a large degree.

23d-85. Interstate Lays First Experimental Section of Welded Aluminum Pipe Line. Paul Reed. *Oil and Gas Journal,* v. 46, April 29, 1948, p. 141-143.

Purpose is to test the ability of aluminum pipe to resist internal corrosion by sour crude and external corrosion by corrosive soils, and also to determine economic possibilities of aluminum pipe for the petroleum industry. Inert-gas arc welding for the job.

23d-86. Die Castings in the Design of Vending Machines: Electric Cigarette Vendor. *Die Castings,* v. 6, May 1948, p. 28-30, 51-54.

23d-87. Small but Mighty. *Die Castings,* v. 6, May 1948, p. 33-34, 43-44.

Use of Al die castings for tiny lathe for precision work in the home workshop.

23d-88. Magnesium Castings—Their Production and Use. A. W. Winston and M. E. Brooks. *Mechanical Engineering,* v. 70, May 1948, p. 425-431.

Previously abstracted from *American Foundryman,* v. 13, Jan. 1948, p. 30-36, See item 23d-25, 1948.

23d-89. Aluminum Invades the Oil Field. *Business Week,* May 15, 1948, p. 92, 94.

New applications, including an aluminum pipeline.

23d-90. Impiego dell' Alluminio nei Rivestimenti Impermeabilizzanti delle Condotte Forzate per Impianti Idroelettrici. (Use of Aluminum as a Lining for Cement Ducts for Hydroelectric Power Plants in Order to Prevent Leakage.) L. Zaretti. *Alluminio,* v. 17, Jan.-Feb. 1948, p. 34-36.

Application gave good results in service.

23d-91. Les Pontes en Aluminium les Engines de Levage et les Excavateurs. (Aluminum Bridges, Cranes, and Power Shovels.) Jean Reinhold. *Revue de l'Aluminium,* v. 25, April 1948, p. 123-128.

23d-92. Le 20e Salon de la Machine Agricole. **(Twentieth Agricultural-**

Machine Show.) Pierre Tournier and Maurice Victor. *Revue de l'Aluminium,* v. 25, April 1948, p. 129-140.
Various applications of light alloys seen at exhibition in Paris, March 2-7, 1948.

23d-93. Le Noble Fue de l'Arc. (The Noble Sport of Archery.) Maurice Victor. *Revue de l'Aluminium,* v. 25, April 1948, p. 141-145.
Use of duralumin for bows.

23d-94. Aluminum Wire. *Western Metals,* v. 6, May 1948, p. 30-31, 42.
Use of steel-reinforced Al cable on the West Coast for high-tension lines. Tables of current carrying capacity and relative weights of Cu and Al cable.

23d-95. The U. S. Army Looks At Magnesium. William H. Middleswart, J. W. Millard and R. A. Wheeler. *Magazine of Magnesium,* May 1948, p. 2-5.

23d-96. Magnesium Furniture Justified in Tradition. G. H. Friese-Greene. *Light Metals,* v. 11, May 1948, p. 236-237, 239-246.

23d-97. Aluminum at the British Industries Fair—1948. *Light Metals,* v. 11, May 1948, p. 247-300.
Aluminum products, and plant and equipment not embodying aluminum in themselves but finding some place in light-alloy technology.

23d-98. Begin First All-Aluminum Arch Bridge. *Engineering News-Record,* v. 140, June 3, 1948, p. 3.
Description of proposed structure across the Saguenay River, Arvida, Quebec.

23d-99. Precision Magnesium Plates, Made by New Technique, Eliminate Electrotypes in Test. Glenn C. Compton. *Inland Printer,* v. 121, May 1948, p.37-39.
Procedure combines a new technique of transferring, etching, and electrotype finishing to obtain a precision printing plate.

23d-100. Done to a Turn. *Die Castings,* v. 6, June 1948, p. 25, 43.
Portable home barbecue outfit has side walls of die-cast aluminum and heat resistant glass.

23d-101. Die Cast Diffuser With Integral Fins. *Die Castings,* v. 6, June 1948, p. 26-28, 44-45.
One of the principal features of the new Lewyt vacuum cleaner—its quiet operation—is made possible by use of a finned ring, die cast in aluminum.

23d-102. Making a Good Impression. *Die Castings,* v. 6, June 1948, p. 31, 45.
Embossing machine, redesigned from cast iron, utilizes Al die castings for two principal parts.

23d-103. Extruded Aluminum Doors. *Product Engineering,* v. 19, June 1948, p. 95.
Combining extruded aluminum sections and steel strips avoids use of sound deadening materials.

23d-104. Gramm Introduces First Model of Aluminum Trailer Series. *Automotive Industries,* v. 98, June 15, 1948, p. 49, 78.

23d-105. Aluminum Jewel-Tone Tile. *Modern Metals,* v. 4, May 1948, p. 19.
Production of "Muralux", a wall tile made of sheet aluminum with the edges curled to form a truncated pyramid. The tile is applied by use of a new mastic-adhesive.

23d-106. New Military Developments Will Utilize Considerable Magnesium. R. A. Wheeler. *Modern Metals,* v. 4, May 1948, p. 20-22.
(Based on talk before Magnesium Association, March 1948.)

23d-107. Residential Roofing and Siding *Modern Metals,* v. 4, May 1948, p. 24-25.

23d-108. Embossed Aluminum Provides Partially Fabricated Product. *Modern Metals,* v. 4, May 1948, p. 28-29.
Patterns and applications. The embossed pattern is said to be so attractive that additional finishing is unnecessary.

23d-109. Aluminum Spoke-Type Trailer Wheel. *Modern Metals,* v. 4, May 1948, p. 32.

23d-110. The Slazenger Die Cast Racket Press. H. K. Barton. *Machinery* (London), v. 72, May 27, 1948, p. 659-662.
Clamping press for tennis rackets made of aluminum. Details of die design.

23d-111. Aluminum Used for 15-Ton Bridge Crane. *Iron Age,* v. 161, June 17, 1948, p. 94.

23d-112. Printing Plates from Seawater? Walter Kubilius. *Bookbinding & Book Production,* v. 46, June 1948, p. 45-48.
Advantages of Mg-alloy plates.

23d-113. Aluminum Jeep Cab. *Modern Metals,* v. 4, June 1948, p. 28.

23d-114. Aluminum for the Dairy Industry. *Modern Metals,* v. 4, June 1948, p. 30-32. Translated and revised from *Revue de l'Aluminium.*

23d-115. Scaffolding in Light Alloy. *Light Metals,* v. 11, June 1948, p. 310-311, 313-323.
Evolution of aluminum-alloy scaffold tubing, with comparative analysis of the properties desired and existing, advantages offered, and

general trend of current developments.

23d-116. Magnesium at Home. *Light Metals,* v. 11, June 1948, p. 328-336.
British applications of magnesium in the home, for military tanks, planes, automobile parts, and industrial equipment.

23d-117. Die Castings Speed Typewriter Production. *Aluminum Bulletin,* v. 1, June 1948, p. 3.
Use of Al die castings.

23d-118. New Cigarette Wrap Highlight of Recent Foil Developments. *Aluminum Bulletin,* v. 1, June 1948, p. 4-5.

23d-119. Aluminum as a Material for Electrical Conductors. Charles Braglio and R. R. Cope. *Electrical Manufacturing,* v. 42, July 1948, p. 74-79.
Comparative properties, including corrosion resistance, are given for various Al alloys and for coppers and brasses.

23d-120. A Shift in Design. *Die Castings,* v. 6, July 1948, p. 25-26, 43-47.
Use of aluminum die castings in Buick Dynaflow transmissions. Castings with cored-out passages replace a mass of pipes for hydraulic hookup.

23d-121. Die Castings—A La Carte. *Die Castings,* v. 6, July 1948, p. 27, 53.
Rubber-tired golf-bag carrier is built almost entirely of highly polished aluminum tubing assembled with die-cast aluminum joints and fittings.

23d-122. Minimizing Friction and Unbalance by the Use of Die Castings. *Die Castings,* v. 6, July 1948, p. 38-43.
Use of aluminum and magnesium die castings in gyroscopic instruments manufactured by Sperry.

23d-123. Aluminum Effects Weight Saving in Crane Structure. *Machine Design,* v. 20, July 1948, p. 131.
Crane used in a Canadian rod mill.

23d-124. Magnesium as Weight Saver. *Aviation Week,* v. 49, July 12, 1948, p. 21-22, 24-25.
Information obtained in utilizing 8000 lb. of magnesium for various parts of the B-36.

23d-125. Aluminum in the Mining Industry. E. P. White. *Engineering and Mining Journal,* v. 149, July 1948, p. 85-89.
Application of high-strength aluminum alloys, such as Alcoa 61S-T6 and 14S-T6, to fabrication and maintenance of equipment.

23d-126. Magnesium in Germany During World War Two. Part V. (Concluded.) Hubert Altwicker and Ernest Josef deRidder. *Modern Metals,* v. 4, July 1948, p. 20-22.
Use by the Navy; miscellaneous uses; and conclusions.

23d-127. Sheet Aluminum for Automotive Uses. Frank W. Lynch and Jules F. Saut. *Modern Metals,* v. 4, July 1948, p. 28-31.
How aluminum is being used by the automotive industry, and some fabricating methods.

23d-128. Inert-Gas Welded Aluminum Pipe Line to Carry "Sour" Oil. *Petroleum Engineer,* v. 19, July 1948, p. 45-46.

23d-129. Aluminum Sheet on Large Roof. *Sheet Metal Worker,* v. 39, July 1948, p. 47.
One of the first large-scale applications of the new 0.004-in. embossed aluminum roofing sheet. Its installation.

23d-130. Hotel Faced With Plastic and Aluminum. *Engineering News-Record,* v. 141, July 22, 1948, p. 70-73.

23d-131. Les Arts Ménagers. (The Household Arts.) Francois Flusin, Jacques Piget, and Maurice Victor. *Revue de L'Aluminium,* v. 25, May 1948, p. 165-174.
Various applications of aluminum in the home.

23d-132. Un essai de destruction d'un moteur électrique utilisant des bobinages en fils d'aluminium isolés par oxydation électrolytique. (A Study of the Destruction of an Electric Motor With Coils and Wires Insulated by Electrolytic Oxidation.) *Revue de L'Aluminium,* v. 25, May 1948, p. 175.
Intentional burning of motor resulted in much less damage than would take place with conventional types.

23d-133. Taboo on Aluminium. *Discovery,* v. 9, June, 1948, p. 166-168.
Application of aluminum to food handling and storage, and possible limitations due to chemical attack or cleaning methods.

23d-134. Air Space-Aluminum Foil Are Ace Insulating "Team". Alexander Schwartz. *Roofing, Siding and Insulation,* v. 7, July 1948, p. 14, 16-17.
Advantages of the above.

23d-135. Structural Use of Aluminium. *Engineer,* v. 186, July 2, 1948, p. 9-10.
15-ton overhead crane and road bridge made of aluminum alloys.

23d-136. New Uses for Aluminum. George Perkins. *Stove Builder,* v. 13, Aug. 1948, p. 52, 54, 58, 60.

23d-137. Magnesium for the World's Largest Bomber. D. A. Tooley. *Modern Metals,* v. 4, Aug. 1948, p. 18-21.

Many of the specific applications. Why magnesium is the best material available for these uses.

23d-138. Some Important Things You Can Do With Wrought Aluminum Alloys. Owen Lee Mitchell. *Light Metal Age,* v. 6, Aug. 1948, p. 8-11.

Basic requirements in determining the feasibility of using aluminum from a fabrication and economic standpoint.

23d-139. Bombole frettate in lega leggera. (Light Alloy Tanks for Compressed Gas.) M. Amico. *Alluminio,* v. 27, March-April 1948, p. 127-142.

Method of production, material used and mechanical properties.

23d-140. Magnesium's Advantages. In What Applications Can They Best Be Used? *Magazine of Magnesium,* Aug. 1948, p. 2-4.

A series of applications for which properties of Mg make it superior to other metals.

23d-141. The Fourteenth Olympiad. *Light Metals,* v. 11, Aug. 1948, p. 441-446.

Use made of light metals in this year's Olympic Games.

23d-142. The Light-Alloy Bicycle in France. Graham Davies. *Light Metals,* v. 11, Aug. 1948, p. 452-459.

A detailed survey of current applications of aluminum to frames, wheels and accessories, with special attention to techniques for joining.

23d-143. Aluminium-Alloy Crane and Bridge. *Engineering,* v. 166, Aug. 6, 1948, p. 127.

Fifteen-ton overhead traveling crane of 97-ft. span recently constructed.

23d-144. The Manufacture and Use of Magnesium and Its Alloys With Special Reference to the Magnesium-Zirconium-Zinc Range. C. J. P. Ball. *Chemistry & Industry,* Aug. 21, 1948, p. 531-536.

Deals especially with the Elektron magnesium alloys (British).

23d-145. Use of Zinc Alloy Die Castings in Waring Blendor. *Machinery* (London), v. 73, Aug. 26, 1948, p. 311-313.

23d-146. They Knew What They Wanted—and Got It. *Die Castings,* v. 6, Sept. 1948, p. 33-34, 61.

Consumer preference was responsible for the change from sand-cast iron to die-cast aluminum for food chopper.

23d-147. The Know-How of Light-Alloy Truck Parts. *SAE Journal,* v. 56, Sept. 1948, p. 27-29. Excerpts from "Design and Operating Experience With Weight-Reducing Materials", by J. L. S. Snead, Jr.

Design principles, including problems involved and cost savings made possible. Typical aluminum parts.

23d-148. Small Lightweight Engine Employs Aluminum Alloy for Principal Parts. *Automotive Industries,* v. 99, Sept. 1, 1948, p. 34, 56.

1½ to 2 hp., single-cylinder, air-cooled, four-cycle engine being placed in volume production.

23d-149. Les transports frigorifiques routiers. (Refrigerated Highway Transportation.) Paul Clément. *Revue l'Aluminium,* v. 25, July-Aug. 1948, p. 229-237.

Construction of French refrigerated trucks, in which light alloys are extensively used.

23d-150. L'Aluminium a la 37e Foire de Paris. (Aluminum at the 37th Paris Fair.) Francis Even and others. *Revue l'Aluminium,* v. 25, July-Aug. 1948, p. 243-251.

Applications displayed.

23d-151. Clock Bearing Plates Made From Aluminum. *Machinery,* v. 55, Sept. 1948, p. 206.

Experiments which demonstrated suitability of aluminum for this application.

23d-152. Aluminum as a Structural Material. Paul Weidlinger. *Progressive Architecture,* v. 29, Sept. 1948, p. 77-84.

A technical study. The introduction is followed by sections on characteristics, forming and fabrication. economic aspects, relationships and implications of physical characteristics and economic aspects. (To be continued.)

23d-153. Magnesium Playing Increasingly Important Role in Graphic Arts. June Walraven. *Inland Printer,* v. 121, Aug. 1948, p. 34-35.

Various applications.

23d-154. Joan Goes on Screen Armed in Magnesium. *Western Metals,* v. 6, Sept. 1948, p. 24.

Use of magnesium armor in new motion picture and its manufacture.

23d-155. Aluminium Rope Units. *Wire Industry,* v. 15, Sept. 1948, p. 595-596.

Various types and designs.

23d-156. A Mammoth Skylight Installation. *Sheet Metal Worker,* v. 39, Sept. 1948, p. 33, 43.

Use of an aluminum type on a

large paper box factory. Includes 603 special aluminum louvered vents.

23d-157. A New Light-Metal and Plastic Laminate. *Light Metals,* v. 11, Sept. 1948, p. 524-526.

New type of decorative sheet having an aluminum core. With this material it is possible to form decorative laminates to relatively small radii, which will find application in interior decoration and in the construction of units such as drain boards and sinks.

23d-158. Mechanical Handling. *Light Metals,* v. 11, Sept. 1948, p. 500-502.

Some applications of Al and Mg shown at 1st National Mechanical Handling Exhibition in England, July 12-21, 1948.

23d-159. Peat Winning Mechanized. *Light Metals,* v. 11, Sept. 1948, p. 494-499.

Uses of aluminum on peat recovery project in Ireland include duralumin rails and ties for traversing the bogs.

23d-160. Toronto Sets the Pace. *Light Metals,* v. 11, Sept. 1948, p. 475-482.

Light-metals exhibits at Toronto's International Trade Fair. Devoted chiefly to magnesium.

23d-161. Experimental House Has Shell, Window Frames, Partitions, Pipes, Wiring, Baseboards, Hardware, Cabinets—All of Aluminum. *Architectural Forum,* v. 89, Sept. 1948, p. 140.

House built for research purposes by Alcoa.

23d-162. Aluminum for Motion Picture Equipment. *Modern Metals,* v. 4, Sept. 1948, p. 28-29.

Five aluminum parts of Victor 16-mm. sound projector.

23d-163. Nové pouziti alkalickych kovu. (New Uses for Alkali Metals). Jan Korecky. *Hutnické Listy,* v. 3, March 1948, p. 80-81.

Uses of Na and Li in deoxidation of alloy steels; various reactions with oxides of Fe, Ni, and Cr; and reactions of Li with H_2O, O_2, and CO.

23d-164. Decorative Laminate With an Aluminium Core. *Plastics,* (London), v. 12, Sept. 1948, p. 467-469.

New type of decorative sheet material developed in England; and its properties, especially with regard to non-inflammability.

23d-165. Le wagon tombereau en alliages legers. (Light-Alloy Railway Hopper Cars.) Jacques Valeur. *Revue de l'Aluminium,* v. 25, Sept. 1948, p. 279-288.

Details of design and use of light alloys.

23d-166. All Aluminum Highway Bridge to Span Saguenay River in Canada. *Civil Engineering,* v. 18, Oct. 1948, p. 42-43.

Canadians will erect world's first all-aluminum bridge between Arvida and Shipshaw. At Arvida also, another "first" in aluminum construction is being realized—an all-aluminum overhead traveling crane of 15-ton capacity, about to be installed in the rod mill of the Aluminum Co. of Canada.

23d-167. Sound Board for Harringay Arena; Aluminum Replaces a Previous Tubular Steel Structure. *Metallurgia,* v. 38, Sept. 1948, p. 292.

23d-168. Phenolic Bonded Metal-Wood Sandwich. *Modern Plastics,* v. 26, Oct. 1948, p. 82-83.

Manufacture of laminate in which a phenolic resin adhesive is used to bond aluminum-alloy faces to a balsa-wood core.

23d-169. Aluminum Exploration Equipment Has Advantages in Gulf Coast Marshes. Leigh S. McCaslin, Jr. *Oil and Gas Journal,* v. 47, Oct. 14, 1948, p. 88-89.

Exploration equipment ranging from portable shot-hole drills to gravity-meter station platforms is now being made of aluminum for use in the inland marine areas of the Gulf Coast. Light weight and corrosion resistance are important factors. Use of magnesium is being considered.

23d-170. Magnesium in the B-36. *Light Metal Age,* v. 6, Oct. 1948, p. 20.

Various applications.

23d-171. Aluminum Alloys. R. H. Brown and E. D. Verink, Jr. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1776-1777.

Developments of past year which have led to new applications in chemical-process equipment, and containers, where corrosion is a factor. 15 ref.

23d-172. Water-Powered Dishwasher. *Modern Metals,* v. 4, Oct. 1948, p. 26.

Substitution of aluminum for steel in this application.

23d-173. Aluminum and Magnesium Castings for Underwood's All Electric Typewriter. *Modern Metals,* v. 4, Oct. 1948, p. 28.

23d-174. Lightweight Licenses; Another End Use for Aluminum. *Western Metals,* v. 6, Oct. 1948, p. 31.

Production of aluminum tags for Washington State.

23d-175. Aluminum Foil Fire Fighting Suit Reflects Heat Radiation. *Tech-*

nical Data Digest, v. 13, Nov. 1, 1948, p. 8-9.

Tests have proven superiority of this suit for fire fighting. Consideration of use for the inner layer of Arctic garments is being given.

23d-176. New Uses Expand Aluminum Casting Applications. Floyd A. Lewis. *Steel,* v. 123, Nov. 1, 1948, p. 84-88, 90.

23d-177. Magnesium Alloy Applications in Germany During the War. Hubert Altwicker and Ernst Josef deRidder. *Magnesium Review and Abstracts,* v. 7, July 1947, p. 43-83.

Previously abstracted from *Modern Metals,* v. 3, Jan. 1948, p. 15-19; v. 4, Feb. 1948, p. 20-24; March 1948, p. 26-30; June 1948, p. 24-27; July 1948, p. 20-22. See item 23d-40, 1948.

23d-178. The Aluminum Tap. *Light Metals,* v. 11, Oct. 1948, p. 530-531.

Use of aluminum faucets in Hungary and modifications in design and fabrication found necessary on substitution of Al for brass.

23d-179. Bobbins for the Textile Industry. *Light Metals,* v. 11, Oct. 1948, p. 536-548.

Production, properties, and applications of Al-alloy bobbins.

23d-180. The Potentialities of Aluminium and Its Alloys for the Paper-Making Industry. *Metallurgia,* v. 38, Oct. 1948, p. 340-341. Based on paper by F. W. Rogers.

23d-181. Instrument Design: An Optical Pyrometer. *Die Castings,* v. 6, Nov. 1948, p. 28-30, 62-65.

Use of Al die castings.

23d-182. Mining with Aluminum Cable. *Coal Age,* v. 53, Nov. 1948, p. 84-85.

Weight and cost advantages. How three Alabama organizations use the insulated aluminum type for both high and low-voltage service.

23d-183. Le pouvoir cicatrisant de l'aluminium. (The Healing Power of Aluminum.) J. E. Lescoeur. *Revue de l'Aluminium,* v. 25, Oct. 1948, p. 324-326; discussion, p. 326-327.

A number of cases in which aluminum was applied with great success in foil or plate form to wounds or burns.

23d-184. Aluminum Die Castings for Electric Cleaners. H. K. Barton. *Machinery* (London), v. 73, Oct. 28, 1948, p. 616-619.

23d-185. Development of Magnesium Applications at Wright-Patterson Air Force Base. Jay R. Burns. *Magazine of Magnesium,* Nov. 1948, p. 8-11.

23d-186. You Can Print Under Water With Uni-Base. William F. Clingman, Jr. *Photo-Engravers Bulletin,* v. 38, Nov. 1948, p. 12-14.

Use of newly developed magnesium mounting material, designed to withstand the high pressures and temperatures encountered with the newer methods of replica molding.

23d-187. Gurley Instruments; The First Aluminum Consumer. *Modern Metals,* v. 4, Nov. 1948, p. 27-29.

Uses of aluminum by instrument manufacturer.

23d-188. Unconsidered Trifles. *Light Metals,* v. 11, Nov. 1948, p. 589-591.

Several household and personal items which are made of aluminum in France and Italy.

23d-189. For the Feast. *Die Castings,* v. 6, Dec. 1948, p. 31, 66-67.

New kitchen tools and utensils in die-cast Al.

23d-190. Aluminium Alloy Wire. Frank H. Slade. *Machinery Lloyd* (Overseas Edition), v. 20, Nov. 20, 1948, p. 104-108.

Advantages and miscellaneous applications.

23d-191. The Steel Shortage: Can Aluminium Help? E. D. Iliff. *Metal Industry,* v. 73, Nov. 26, 1948, p. 423-426.

The case for aluminum in construction of heavy equipment and structures, from the British viewpoint.

23d-192. Aluminum Backed Phosphor Screen in Cathode Ray Tubes. Arthur Bramley. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 279-282; discussion, p. 283-284.

Previously abstracted from preprint. See item 23-262, 1947.

SECTION XXIV

DESIGN AND STRESS ANALYSIS

24a—General

24a-1. Machine Taps. *Machinery* (London). v. 71, Nov. 20, 1947, p. 574-575.

Recommended designs, especially of the fluted part.

24a-2. Moving Loads on Continuous Beams. J. J. O'Donovan. *Engineering*, v. 164, Nov. 21, 1947, p. 484-486; Nov. 28, 1947, p. 509-510.

A mathematical development.

24a-3. Equipment. *Steel,* v. 122, Jan. 5, 1948, p. 217-218, 220-222.

Brief reviews of recent developments: Steeple-Type Vertical Worm Gear Reducer Developed, by R. C. Ball; Mill Operators' Demands Met by Equipment Manufacturers, by F. E. Walling; Resistance Welding Machines Designed for High Production, by G. W. Garman; Industrial Plants Built With Controlled Conditions, by J. K. Gannett; New Metallizing Unit Makes Many Spraying Speeds Possible, by L. E. Kunkler; Equipment for Flame Cutting Stainless Steel Introduced, by G. E. Bellew; Welding Control Manufacturers Offer New Safety Equipment, by C. B. Stadum; Axial Air Gap Motor Used in Certain Machine Applications, bv H. A. Bamford; Special Resistance Welding Machines More Widely Used, by F. R. Hensel; Recruiting Maintenance Men Problem in Smaller Plants, by J. C. Hanna; Progress in Electrical Equipment Continues, by Ernest E. George; Uses of Flexible Metal Tubing Become More Varied, by S. H. Collom, Jr.; Welding Performance Improved by New Equipment, by C. I. MacGuffie; Machine Tool Advancements Attributed to Controls, by D. W. McGill; Use for Precision Cast Superalloys to Increase in 1948, by W. O. Sweeny; Qualified Mechanics Seen as Great Industrial Need, by Walter J. Brooking; New Electrical Equipment for Sheet and Tinplate Mills, by G. E. Stoltz; Reversing Hot Strip Mill Has Unusual Feature, by H. W. Poole; Underbead Cracking Eliminated by Lime-Ferritic Electrodes, by J. H. Deppeler.

24a-4. The Elasto-Plastic Stability of Plates. A. A. Ilyushin. *National Advisory Committee for Aeronautics, Technical Memorandum No. 1188,* Dec. 1947, 30 pages. Translated from *Prikladnaia Matematika i Mekhanika,* X, 1946.

The stress-strain relations developed by the author in previous work for use beyond the elastic range are simplified and applied to thin plates, in the elastic, the elastoplastic, and the plastic zones. The stability of plates compressed beyond the elastic range is studied and examples are given of exact and approximate solutions.

24a-5. Putting Inserts to Work in a ¾-Ton Puller. *Die Castings,* v. 6, Jan. 1948, p. 40-43.

Design details of device resembling a chain hoist, but made for horizontal pulling, and built primarily of aluminum die castings. Inserts consist of: sintered bronze bushings; a hardened steel ratchet; a forged steel chain guide; and a steel sleeve.

24a-6. Recording Stress Level Gage. R. C. Walker and J. H. Meier. *Product Engineering,* v. 19, Jan. 1948, p. 138-139.

Gage for permanent installation on large structures in order to record over long periods of operation the stresses that result from loads on structural members.

24a-7. Designing for Shock Resistance. Geert Beling. *Product Engineering,* v. 19, Jan. 1948, p. 140-143.

Methods for shock measurement and shock testing. Four methods for shock proofing; design procedures.

24a-8. Lubrication Factors in Bearing Design. *Machinery,* v. 54, Jan. 1948, p. 146-153.

24a-9. Profile Gage Problem. Henry R. Bowman. *Machinery,* v. 54, Jan. 1948, p. 175.

Problem in connection with manufacture of ordnance shells is worked out.

24a-10. Some Elementary Considerations of the Stress-Strain Curve. R. M. How-

arth. *Aircraft Engineering,* v. 19, Dec. 1947, p. 372-377.

Application to aircraft design and utilization.

24a-11. Laying Out Tooth Forms for Spline Shaft Hobs. F. E. Lindsay. *Machinery* (London), v. 71, Dec. 18, 1947, p. 689-693.

24a-12. The Wire Resistance Strain Gage. P. Savic. *Research,* v. 1, Dec. 1947, p. 98-106.

Fundamental principles, method of construction, and applications. 11 ref.

24a-13. The Boundary-Valve Problems of Plane Stress. Part 1. G. H. Livens and Rosa M. Morris. *Philosophical Magazine,* 7th Series, v. 38, March 1947, p. 153-179.

A mathematical development, using a slight modification of the method of Stevenson and Green in combination with a method developed by one of the authors for problems of hydrodynamics and elasticity. Fundamental equations for stresses and displacements; characteristic stress potentials; effect of an elliptical hole on a specified stress distribution; the stressed boundary problem. 12 ref.

24a-14. Stresses Near the End of a Long Cylindrical Shaft Under Nonuniform Pressure Loading. C. J. Tranter and J. W. Craggs. *Philosophical Magazine,* 7th Series, v. 38, March 1947, p. 214-225.

An analytical solution; its numerical applications; comparison with results obtained by approximate methods.

24a-15. The Theorem of Four Moments, With Applications in the Theory of Plane Structures. F. J. Turton. *Philosophical Magazine,* 7th Series, v. 38, April 1947, p. 251-267.

Deals only with plane structures. Some simple examples in which not more than two beams are rigidly joined at any one point. Determination of the end moments for the members of the rigidly jointed plane frame of a framed building and determination of the end moments required to find secondary stresses in a plane frame with rigid joints.

24a-16. Bending of Clamped Rectilinear Plates. B. R. Seth. *Philosophical Magazine,* 7th Series, v. 38, April 1947, p. 292-297.

In the bending of rectilinear plates with supported edges, solution can be made to depend on the corresponding torsion solution for the boundary when the plate is bent by uniform pressure. A simple solution has also been given for an equilateral plate. Solution for a rectangular plate which has been obtained in the form of a double Fourier's series now shows that the general case of a rectilinear plate can also be obtained in the form of a double series.

24a-17. Stress-Strain Compatibility in Greatly Deformed Engineering Metals. K. H. Swainger. *Philosophical Magazine,* 7th Series, v. 38, June 1947, p. 422-439.

A highly theoretical discussion covering physical bases; compatibility of displacement and "true" strain; stress-strain compatibility; isotropic inelastic metals with moduli which are a function of position and with constant moduli. 20 ref.

24a-18. How the Hopper Car Has Developed. George A. Suckfield. *Railway Age,* v. 124, Jan. 17, 1948, p. 41-44.

Nine examples show trends throughout the steel era. Experience with lightweight cars and the problem of weight reduction.

24a-19. Torsional Vibration Frequency. Frederic P. Porter. *Machine Design,* v. 20, Jan. 1948, p. 153-156. Based on paper presented to the S.A.E.

Charts and formulas for determining the above with sufficient accuracy for preliminary estimation.

24a-20. Die Casting Die Design. Part I. H. K. Barton and J. L. Erickson. *Tool & Die Journal,* v. 13, Jan. 1948, p. 48-51, 84-86.

Ejection from the die; method of ejection; ejector pins; methods of ejection other than by ejector pins; dimensioning the pin.

24a-21. Cost Cut by Better Method. *Production Engineering & Management,* v. 21, Jan. 1948, p. 49.

Improved method of making templets from lofts.

24a-22. Instability of Simply Supported Square Plate With Reinforced Circular Hole in Edge Compression. Samuel Levy, Ruth M. Woolley, and Wilhelmina D. Kroll. *Journal of Research of the National Bureau of Standards,* v. 39, Dec. 1947, p. 571-577.

A method for computing the compressive buckling load of the above type of plate. Numerical results for six square plates having hole diameters up to one-half the plate length. Comparison with results for plates without holes shows that an unreinforced circular hole causes a relatively small reduction in buckling load, and reinforcement by a doubler plate causes a substantial increase.

24a-23. Tubes in Manufacturing. Edwin Laird Cady. *Scientific American,* v. 178, Feb. 1948, p. 60-62.

Varied uses of tubing as an intermediate step in manufacturing processes, rather than as an end product; for example, races of ball bear-

ings made from tubing and tubular shapes used as design elements in weldments.

24a-24. Formula for Corrected Gears Working at Nonstandard Center Distance. J. Turner. *Machinery* (London), v. 72, Jan. 1, 1948, p. 11-13.

A geometrical and algebraical development.

24a-25. An Improved Photo-Elastic Method for Determining Plane Stresses. C. B. Norris and A. W. Voss. *National Advisory Committee for Aeronautics, Technical Note* No. 1410, Jan. 1948, 43 pages.

Drucker's method is extended by means of an additional oblique photograph, and simpler equations for relating fringe order to principal stresses are derived. The method is considered more accurate than Drucker's use of Stresscoat and was found desirable for greater accuracy in determination of directions of principal stresses.

24a-26. Instability of Outstanding Flanges Simply Supported at one Edge and Reinforced by Bulbs at Other Edge. Stanley Goodman and Evelyn Boyd. *National Advisory Committee for Aeronautics, Technical Note* No. 1433, Dec. 1947, 25 pages.

The compressive buckling stress of outstanding flanges reinforced by bulbs was determined by the torsion-bending theory for flanges having 54 shapes and a range of length. Results are analyzed and an empirical formula for flanges capable of giving the most support without torsional buckling is presented.

24a-27. Performance Tests of Wire Strain Gages. VI. Effect of Temperature on Calibration Factor and Gage Resistance. William R. Campbell.*National Advisory Committee for Aeronautics, Technical Note* No. 1456. Jan. 1948. 25 pages.

Variations with temperature for 15 types of single-element, multistrand-wire, strain gages. For 13 types, the maxamum difference between room temperature calibration factor and that between −73 and 93° C. did not exceed 4%.

24a-28. Sur le Flambement des Poutres Droites a Section Constante et a Momente d'Inertie Variable. (Yield Strength of Straight Beams of Constant Cross Section and Variable Moments of Inertia.) Florin Vasilisco, *Comptes Rendus* (France), v. 225, Oct. 27, 1947 p. 716-718; Nov. 3, 1947, p. 794-796.

A general method is developed and series of formulas proposed whose application to practical problems was successful. The method is extended to a beam stressed at any point, instead of only at the point of suspension.

24a-29. La Securite des Pieces de Grande Longeur. (The Safety of Very Long Pieces). Robert Leve. *Comptes Rendus* (France), v. 225, Nov. 24, 1947, p. 988-990.

Safety factors for very long structural parts are calculated by comparison with the fatigue strength of short ones.

24a-30. Entwicklung und Anwendung der Elektrischen Dehnungsmesser zur Messung von Statischen und Dynamischen Spannungen. (Development and Application of Electrical Extensometer for Measurement of Static and Dynamic Stresses.) A. R. Anderson. *Schweizer Archiv,* v. 13, Nov. 1947, p. 321-326.

Methods for measuring stresses, covering both principles and applications to various problems.

24a-31. Creep Phenomena Under Complex Stress Conditions. (In Russian.) L. M. Kachanov. *Kotloturbostroenie* (Boiler and Turbine Manufacture), Aug. 1947, p. 6-10.

Alterations of deformation and stress per unit of time were studied in a series of problems. For example, the problem of creep of a spherical container and cylindrical tube with thin walls is solved by a very simple method.

24a-32. Antifriction Bearings. Part VI and VII. L. E. Browne. *Steel,* v. 122, Jan. 26, 1948, p. 50-53, 73; Feb. 9, 1948, p. 76-79, 107.

Lubricants and lubricating systems for successful functioning of antifriction bearings. Recent developments in mountings for steel mills, and the importance of correctly designed seals and closures.

24a-33. Progressive Die Design, I. C. W. Hinman. *Modern Machine Shop,* v. 20, Feb. 1948, p. 124-130.

Its application to perforating, drawing, piercing, embossing, and blanking steel escutcheon plates.

24a-34. Stress Analysis of Noncircular Rings for Monocoque Fuselages. Chi-Teh Wang and S. Ramamritham. *Journal of the Aeronautical Sciences,* v. 14, Dec. 1947, p. 707-712.

Application of the method of least work to analysis of fuselage rings admits two possible sources of computational error. A method that reduces both sources of error; its advantages.

24a-35. Cardboard-Box Wing Structures. F. R. Shanley. *Journal of the Aeronautical Sciences,* v. 14, Dec. 1947, p. 713-715.

Design and testing of structures which consist of two metal sheets joined by a third corrugated sheet, which resembles fiberboard construction. Advantages.

24a-36. The Use of Electrical Strain Gages in Machine Design. W. R. Mehaffey. *Frontier,* Dec. 1947, p. 11-14, 22.
Methods and equipment. 10 ref.

24a-37. Photo-Elasticity. H. T. Jessop. *British Science News,* v. 1, no. 4, 1947, p. 9-12.
Theory and practice of photo-elastic stress analysis.

24a-38. Charts for Calculating Root Stresses in Spur Gears. Wayne H. Bookmiller. *Product Engineering,* v. 19, Feb. 1948, p. 161, 163.
Their derivation explained.

24a-39. Design Charts for Spur and Helical Gears. F. G. Watts. *Machinery* (London), v. 72, Jan. 15, 1948, p. 67-73.

24a-40. Intermeshing Noncircular Algebraic Gears. Clive Temperley. *Engineering,* v. 165, Jan. 16, 1948, p. 49-52.
Details of design calculations.

24a-41. On the Stresses in a Plate Containing Two Circular Holes. Chih-Bing Ling. *Journal of Applied Physics,* v. 19, Jan. 1948, p. 77-82.
A theoretical solution to the problem. Three fundamental stress systems, namely, the all-around tension case, the longitudinal tension case, and the transverse tension case. Formulas for stress along the edges of holes are derived and values of maximum stress are calculated. The limiting case in which the holes are tangential is also discussed.

24a-42. Salient Features of Handwheel Design. H. F. Williams. *Machine and Tool Blue Book,* v. 44, Feb. 1948, p. 169-170, 172, 174, 180, 182, 184, 186-187.

24a-43. Power Plant Men See New Engines Bring New Problems. *SAE Journal,* v. 56, Feb. 1948, p. 79-81.
Reviews seven papers and accompanying discussion devoted to materials and fuels problems brought about by use of higher temperatures in aircraft power plants, presented at S.A.E. annual meeting, Detroit, Jan. 12-16, 1948. Includes stress analysis and design; use of ceramic bodies and coatings; aviation-fuel performance; use of direct injection of fuels; and ramjets for supersonic propulsion.

24a-44. Plastics Design Factors in Transfer-Molding Techniques. Wesley S. Larson. *Electrical Manufacturing,* v. 41, Feb. 1948, p. 96-100, 172, 174, 176.
Advantages and limitations of methods where the design involves molded-in metal inserts or other intricate use of metals in combination with plastics, or calls for delicate mold construction.

24a-45. Electrical Resistance Wire Strain Gages—Their Development and Use. J. Edwards. *Metal Treatment,* v. 14, Winter 1947-48, p. 213-221.
Development and use including an exposition of fundamental principles. 14 ref. (To be continued.)

24a-46. Optimum Number of Webs Required for a Multicell Box Under Bending. George Gerard. *Journal of the Aeronautical Sciences,* v. 15, Jan. 1948, p. 53-56.
Theoretical results are presented in which the optimum number of webs was found to be a function of the structural thickness ratio only. Nondimensional design charts are included. An investigation was also made to determine the weight penalty involved in using a number of webs other than optimum. It was found that for a slight weight penalty it is possible to reduce the number of webs required and still maintain an efficient design. 13 ref.

24a-47. Stresses in and General Instability of Monocoque Cylinders With Cutouts. Part V—Calculation of the Stresses in Cylinders With Side Cutout. N. J. Hoff and Bertram Klein. *National Advisory Committee for Aeronautics. Technical Note* No. 1435, Jan. 1948, 33 pages.

24a-48. On the Interpretation of Combined Torsion and Tension Tests of Thin-Wall Tubes. W. Prager. *National Advisory Committee for Aeronautics, Technical Note* No. 1501, Jan. 1948, 11 pages.
General ways of testing thin-wall tubes under combined tension and torsion as a means of checking the various theories of plasticity. Suggestions for interpretation of the tests.

24a-49. Summarized Proceedings of Conference on "Stress Analysis"—London, 1947. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Jan. 1948, p. 19-23.
Meeting of March 25-27, 1947.

24a-50. Undercuts on Threaded Work. R. E. Mills. *Machinery* (London), v. 72, Jan. 29, 1948, p. 140-143.
An undercut is defined as the recess at the shoulder end of the screwed portion of a component which enables the female section to be screwed home. Need for standardization and design factors. Methods for specifying undercut and British standard dimensions.

24a-51. The Future of Steam Locomotives. C. R. H. Simpson. *Engineer,* v. 185, Jan. 30, 1948, p. 113.

Design and metallurgical problems. (Condensed from paper presented at Symposium on Railways, Junior Institution of Engineers, Jan. 16, 1948.)

24a-52. Calculation of Uncoupled Modes and Frequencies in Bending or Torsion of Nonuniform Beams. John C. Houbolt and Roger A. Anderson. *National Advisory Committee for Aeronautics, Technical Note No.* 1522, Feb. 1948, 75 pages.

Presents a simple iteration procedure using numerical integration. All computations can be performed mentally or with the aid of a slide rule. The method applies to nearly all types of beams.

24a-53. Lightness and Strength Combined in Metal-Wood Composites. Kenneth Rose. *Materials & Methods,* v. 27, Feb. 1948, p. 70-73.

How woods of many types are used with a wide variety of metals to provide composite materials required for special combinations of properties.

24a-54. Rubber and Steel. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 107-108.

Advantages and varied applications of rubber expansion joints between metal members.

24a-55. Measurement of Stress by Means of X-Rays. D. E. Thomas. *Journal of Applied Physics,* v. 19, Feb. 1948, p. 190-193.

How the formulas used in stress measurement by X-rays are derived. Points out an error in a recently published book, "X-Rays in Practice", by Wayne T. Sproull.

24a-56. Designing for Economical Manufacture. Benjamin N. Ashton. *Machine Design,* v. 20, Feb. 1948, p. 101-106.

A method which has resulted in substantial cost reduction in manufacture. Improved performance as well as simplified manufacturing are the concrete result of giving production methods adequate consideration during design. The system used is illustrated by its application to several aircraft parts, including landing-gear strut and axle, hydraulic cut-out valve, and hydraulic activating cylinder.

24a-57. Disk Stresses. V. G. Guins and G. H. Heiser. *Machine Design,* v. 20, Feb. 1948, p. 144-148, 188-189.

A practical method for calculating stresses due to rotation and to interference fits.

24a-58. A Clinical Approach to Weldment Design. Gerald Von Stroh. *Welding Engineer,* v. 33, March 1948, p. 36-41.

Previously abstracted from *Steel,* v. 122, Jan. 19, 1948, p. 68-72, 106. See item 24b-7.

24a-59. Dimensional Instability Affects Design of Precision Equipment. Parts I and II. Frederick C. Victory. *American Machinist,* v. 92, Feb. 26, 1948, p. 108-111; March 11, 1948, p. 144-147.

Dimensional instability may be defined as any change, not resulting from wear or abrasion, in dimensions or shape of any unit, part, or assembly. The following causes are most frequently encountered: thermal expansion; unstable constituents; stresses in the material; and applied stresses. The first of these causes is discussed and illustrated by a typical example—a high-speed grinding head driven by a pneumatic turbine—in which expansion and backlash caused a change in preload of bearings. How the condition was remedied by redesign. In Part II—case examples of products supposedly heat treated properly and what was wrong in their handling.

24a-60. Stress Concentration and Fatigue Failures. Stepan Timoshenko. *Institution of Mechanical Engineers, Proceedings,* v. 157, War Emergency Issue No. 28, 1947, p. 163-169.

Experimental stress analysis required for complex parts and their combination with theoretical calculations. Effects of shot-peening on parts such as axles. Photographs show photoelastic patterns, various stress analysis apparatus, and examples of fatigue cracking.

24a-61. Predesign Research as Applied to Product Development. Roger L. Nowland. *Mechanical Engineering,* v. 70, March 1948, p. 208-210, 225.

Presented at annual meeting, A.S.M.E., Atlantic City, Dec. 1-5, 1947.

24a-62. The Estimation of Stresses in Turbine-Disk Rims. G. F. C. Rogers. *Engineering,* v. 165, Jan. 2, 1948, p. 1-4; Jan. 9, 1948, p. 40-42.

A mathematical analysis.

24a-63. Nonlinear Large-Deflection Boundary-Value Problems of Rectangular Plates. Chi-Teh Wang. *National Advisory Committee for Aeronautics, Technical Note No.* 1425, March 1948, 113 pages.

Relaxation and successive approximation methods used to solve Von Karman's equations as applied to initially flat, rectangular plates with large deflections, under either normal pressure or combined normal pressure and side thrust.

24a-64. The Buckling of a Column on Equally Spaced Deflectional and Rotational Springs. Bernard Budiansky, Paul Seide, and Robert A. Weinberger.

National Advisory Committee for Aeronautics, Technical Note No. 1519, March 1948, 42 pages.

A solution for the problem. Useful charts relate deflectional spring stiffness, rotational spring stiffness, and buckling load, for columns having 2, 3, 4, and an infinite number of spans.

24a-65. The Place Bolt. C. L. Brackett. *Fasteners,* v. 4, no. 4, 1948, p. 16-19.

A special type of bolt which provides for elastic yield without reduction in shank diameter. The head is formed with a centrally disposed recess in its upper face, and a circular recess adjacent to the shank in its underface. Between the radii of these recesses a diaphragm of metal is arranged in the form of the conical surface of a frustum. Weight savings in comparison with standard bolts. Construction is applicable to both bolts and cap screws.

24a-66. New Method of Producing Three-Dimensional Plaster Models. John S. Haldeman. *Machinery,* v. 54, March 1948, p. 144-149.

A time-saving method applicable in automobile, aircraft, and shipbuilding industries which involves the use of a "contour developer".

24a-67. Progressive Die Design, Part II. C. W. Hinman. *Modern Machine Shop,* v. 20, March 1948, p. 124-128.

A method for designing a double die which utilizes the scrap metal to feed two rows of workpieces through the several stages preceding the final operation.

24a-68. Three Methods for Spring Stress Calculation. *Mainspring,* v. 12, Feb. 1948, p. 1-4.

Outlines the ordinary-stress method; the average-stress method; and the corrected-stress method; and compares their accuracy and usefulness.

24a-69. The Development of Complex Patterns. A. Dickason. *Sheet Metal Industries,* v. 25, Feb. 1948, p. 345-348.

First of a series dealing with layout of sheet-metal ducts of complex design.

24a-70. Designing Tapered Gears. B. Bloomfield. *Machine Design,* v. 20, March 1948, p. 125-130.

Graphical construction and mathematical analysis are explained for both on-center and offset types.

24a-71. Ring Deflection. H. D. Tabakman. *Machine Design,* v. 20, March 1948, p. 131-134, 196.

Mathematical derivations and curves for calculation of the above for circular rings loaded normal to the plane of curvature.

24a-72. Leaf-Spring Deflection. F. Heller. *Machinery* (London), v. 72, Feb. 26, 1948, p. 274-276.

Design calculations.

24a-73. Forging Die Design; Helve-Hammer Dies. John Mueller. *Steel Processing,* v. 34, March 1948, p. 137-140.

24a-74. Stresses in Turbine Disks at High Temperatures. E. P. Popov. *Journal of the Franklin Institute,* v. 243, May 1947, p. 365-389.

Results of a study of stress distribution and creep deformation in rotating disks. It is primarily confined to stress distribution and deformations that occur during the steady state for service periods beyond the interval in which rather rapid transient creep takes place. A modified solution of a current method which depends only on the data derivable from tension-creep tests. This results in simplification of the solution and greatly expands the use of normally available test data. The analyses apply only to materials found stable for high-temperature service.

24a-75. The Compound Cylinder and the Strength Problem. C. W. MacGregor and L. F. Coffin, Jr. *Journal of the Franklin Institute,* v. 243, May 1947, p. 391-421.

Effects of various strength theories on design of compound cylinders composed of as many as four concentric tubes. The problem considered is limited to simultaneous yielding in all the tubes under the action of bore pressure. New short design procedures using graphical means. The methods used are flexible since component tubes of different materials following different strength theories can be treated as easily as cylinders composed of tubes of one material.

24a-76. Numerical Transformation Procedures in Continuous Beam Analysis. Stanley U. Benscoter. *Journal of the Franklin Institute,* v. 244, July 1947, p. 15-26.

Several new procedures for calculation of bending moments in continuous beams. A mathematical demonstration of the validity of the procedures.

24a-77. A Principal Stress Method of Stress Analysis. H. B. Maris. *Journal of the Franklin Institute,* v. 244, July 1947, p. 27-62.

A new method for analysis of photo-elastic strain figures.

24a-78. An Integral-Equation Approach to Problems of Vibrating Beams. Part II. Walter T. White. *Journal of the Franklin Institute,* v. 245, Feb. 1948, p. 117-133.

Mathematical calculations and their use by application to twisted turbine blades. 42 ref.

24a-79. Partially Plastic Thick-Walled Tubes. C. W. MacGregor, L. F. Coffin, Jr., and J. C. Fisher. *Journal of the Franklin Institute,* v. 245, Feb. 1948, p. 135-158.

A theory is presented for the partial plastic yielding of thick-walled cylindrical tubes acted upon by any combination of internal pressure, external pressure, and end load when the material follows an arbitrary stress-strain law. The solution combines the distortion-energy theory of plastic flow and the effects of elastic compressibility of the plastic material. Numerical values for stresses and strains are given for certain special cases and results are compared with earlier approximate theories.

24a-80. The Statistical Estimation of the Effect of Size on the Breaking Stress of Rods. C. Gurney. *Aeronautical Research Council, Reports and Memoranda* No. 2157, (Great Britain), March 1945, 10 pages.

Methods for estimating the size effect from the scatter of test results. Thousands of test results are necessary to obtain a reasonable estimate of the strength of material whose size differs much from that tested. The theory strictly applies only to material which is statistically homogeneous. However, many practically useful materials do not meet this condition; for such materials the theory gives only qualitative results, the predicted strength to size gradient being usually greater than that obtained experimentally.

24a-81. On the Cantilever Composed of a Number of Parallel Beams Interconnected by Cross Bars. Letitia Chitty. *Philosophical Magazine,* 7th Series, v. 38, Oct. 1947, p. 685-699.

A mathematical analysis of the above structural problem.

24a-82. An Integral-Equation Approach to Problems of Vibrating Beams. Walter T. White. *Journal of the Franklin Institute,* v. 245, Jan. 1948, p. 25-36.

Integral equations are applied for the calculation of the normal modes of vibrating beams. Both exact and approximate methods of solving the integral equation are considered. The Green's function, or kernel, of the integral equation is constructed for both uniform and nonuniform beams. Solutions for the normal modes of a uniform cantilever. A nonuniform, naturally-twisted turbine blade is studied in detail and the first and second normal modes are calculated.

24a-83. Needle Bearings in Tapping and Threading Unit. *Bearing Engineer,* v. 8, Jan.-Feb. 1948, p. 2-3.

Cutaway drawings show design details.

24a-84. The Plastic Flow of Thick-Walled Tubes With Large Strains. C. W. MacGregor, L. F. Coffin, Jr., and J. C. Fisher. *Journal of Applied Physics,* v. 19, March 1948, p. 291-297.

Theory for a material having an arbitrary true stress-strain curve, loaded by any combination of internal pressure, external pressure, and end load. Comparisons are made of the finite-strain theory, the infinitesimal strain theory, and experimental results for the special case of a closed-end thick walled aluminum tube. The infinitesimal-strain theory was found to be considerably in error even at moderate strain values. The finite-strain theory appears to be satisfactory even for strains somewhat beyond the value for the local bulging of thick-walled tubes.

24a-85. Effects of Cutouts in Semimonocoque Structures. P. Cicala. *Journal of the Aeronautical Sciences,* v. 15, March 1948, p. 171-179.

Stress distribution in monocoque structures having cutouts has previously been investigated by several authors under the assmuption of rigid frames. This problem is dealt with for the circular cylinder reinforced by equal and equally spaced stringers and by equal flexible circular frames.

24a-86. Manufacture of Mill Type Motors. C. B. Hathaway. *Iron and Steel Engineer,* v. 25, March 1948, p. 105-106.

Design of improved type and miscellaneous fabrication procedures at Westinghouse Electric Corp., Buffalo.

24a-87. Stresses in and General Instability of Monocoque Cylinders With Cutouts. VI — Calculation of the Buckling Load of Cylinders With Side Cutout Subjected to Pure Bending. N. J. Hoff, Bertram Klein, and Bruno A. Boley. *National Advisory Committee for Aeronautics, Technical Note No.* 1436, March 1948, 30 pages.

A strain-energy theory was developed for calculation of the above. The theory was applied to two series of specimens, each containing three cylinders. Average deviation between theoretical and experimental buckling load was 27.1% for the first series and 34.4% for the second.

24a-88. Photo-Elastic Investigation of Internal Stresses in Silver Chloride Caused by Plastic Deformation. J. F. Nye. *Nature,* v. 161, March 6, 1948, p. 367-368.

Since X-ray diffraction investigation of stresses in cold worked metals can indicate only the presence and magnitude of internal stresses, but not their spatial distribution, transparent crystals of AgCl were investigated under conditions of plastic deformation. It is believed that the results, which are illustrated, are also applicable to metals.

24a-89. Designing for Resistance Welding. Ernie Lauter. *Industry and Welding,* v. 21, April 1948, p. 82-84.

Examples include combination aluminum storm and screen windows and garden tools.

24a-90. Effect of Embedding the Ends of Rods in Elastic Material on Their Bending Strength. (In Russian.) A. N. Dinnik and Z. B. Pinskaya. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), Dec. 1947, p. 1585-1588.

A mathematical solution for the above problem for the case in which both ends are embedded in an elastic or plastic material, the strengths of the two end fastenings being unequal and load being applied at the middle of the rod.

24a-91. Another "Twist" to Torsion Springs. *Mainspring,* v. 12, April 1948, p. 2-7.

Design formulas and tables and applications.

24a-92. Salient Features of Handwheel Design. H. F. Williams. *Machine and Tool Blue Book,* v. 44, April 1948, p. 205-206, 208, 210, 212, 214, 216-218, 220.

Third of series on machine-tool handwheels covers counterbalancing at the rim; modernistic designs; unbalanced handwheels; position of operating handle; and large light handwheels.

24a-93. Systematic Expression for Stress-Strain-Temperature Relationships. Michael B. Corson. *Metal Progress,* v. 53, April 1948, p. 538.

Questions use of the formula: $\delta\varepsilon = Ke^{q/rt}$ to connect the stress corresponding to the strain to the absolute temperature T at which the testing is done, and presents what is believed to be a more logical approach to the problem.

24a-94. A General Approximation Method in the Theory of Plates of Small Deflection. M. Zbigniew Krzywoblocki. *Quarterly of Applied Mathematics,* v. 6, April 1948, p. 31-52.

A new method which aims at solution of the problem quite independently of the shape of the plate. If there is no lateral load, that is, if the forces act in the plane of the plate, the method is successful whether the forces are distributed uniformly or not. If there is a lateral load, the method is not always successful. 10 ref.

24a-95. Industrial Safety and the Tool Designer, H L. Smith. *Tool Engineer,* v. 20, April 1948, p. 25-28.

Items which illustrate principles of tool design for safety.

24a-96. Precision Investment Casting. Edwin Laird Cady. *Product Engineering,* v. 19, April 1948, p. 81-85.

Characteristics of alloys used, effect of machinability on design, and detailed design procedure for high and low-machinability alloys.

24a-97. How to Organize for Experimental Stress Analysis. *Product Engineering,* v. 19, April 1948, p. 113-136.

Various equipment requirements, advantages, limitations, costs, and specific information on techniques utilizing brittle coatings, photo-elasticity, electric strain gages, and mechanical strain gages.

24a-98. Formulas for Spring Redesign. A. Bodenshatz. *Product Engineering,* v. 19, April 1948, p. 143.

Equations to solve problems of reducing spring stress without changing spring rate, installed height or solid height of circuit-breaker springs.

24a-99. Strain Gage Technique Employed in Studying Propane Tank Stresses Under Service Conditions. L. P. Zick and C. E. Carlson. *Steel,* v. 122, April 12, 1948, p. 86-88.

Method used to study stresses in long horizontal storage tanks supported in two places. 116 delta-type, Baldwin SR-4 strain gages were mounted and connected to control equipment for determining effect of variations in position of supporting saddles on stresses in shell and head of a 30,000 gal. tank.

24a-100. Lighter and Stronger Car Bodies Using Aircraft Design Practices. E. W. Conlon and G. W. Lothrop. *Automotive Industries,* v. 98, April 15, 1948, p. 46-48, 68, 70. A condensation.

Research at University of Michigan shows that strength and rigidity requirements of the conventional passenger car, as determined by static tests and stress analysis for bending and torsion, can be met by lighter body and frame structure, when built in accordance with air-

craft-design principles. (Presented at recent convention, American Society of Body Engineers, Detroit.)

24a-101. The Effective Stress Concentration at the End of a Crack in Materials Having Atomic Constitution. C. Gurney. *Philosophical Magazine,* 7th Series, v. 39, Jan. 1948, p. 71-76.

Cracks are assumed to have elliptic form and average stress over a small area at the end of the major axis of an elliptic crack is computed in terms of the ratio of the lengths of the major and minor axes of the ellipse, and of the ratio of the average length to the radius of curvature at the end of the crack.

24a-102. A New Criterion of Yielding in Metals Due to Complex Stresses. K. H. Swainger. *Philosophical Magazine,* 7th Series, v. 39, Feb. 1948, p. 122-133.

The plane-stress experimental ellipse is accepted and the equation for it is written in linear form by means of vectors. It is shown that any plane-stress system except "two-dimensional hydrostatic pressure or tension" will reduce to simple shear with simple tension or compression at any point by choosing suitable directions to define the orthogonal element on which the stresses act. Experimental results on yield-stress values then apply to the element with this orientation. Any three-dimensional stress system except hydrostatic pressure or tension can be reduced to one of simple tension or compression together with two shears at any given point by suitable choice of directions. These three stresses will define two ellipsoidal surfaces for complete specification of yielding.

24a-103. Warping and Shear Lag in Closed Cylindrical Shells. Leon Beskin. *Journal of the Aeronautical Sciences,* v. 15, April 1948, p. 221-231.

The state of stress in thin-walled closed cylindrical shells was determined in the neighborhood of sections with concentrated loads or of sections corresponding to discontinuities of section properties, such as fixed ends. A method of successive approximations was developed, using conventional beam formulas as the first approximation. The second approximation was determined and examined in some detail for cases of torsion and bending. Superposition of the two solutions gives the possibility of writing arbitrary warping conditions at given sections.

24a-104. The Analysis of a Circular Ring With Propped Floor Beam. J. S. Taylor and S. S. Gill. *Journal of the Aeronautical Sciences,* v. 15, April 1948, p. 237-242.

A method for analyzing a circular fuselage former with a floor crossbeam supported by four vertical struts.

24a-105. Internal Stresses in Metals and Alloys: Part I. *Industrial Heating,* v. 15, April 1948, p. 590, 592, 594, 596.

Summarizes papers presented at symposium conducted by the British Institute of Metals.

24a-106. Die-Grams. Karl L. Bues. *Western Machinery and Steel World,* v. 39, April 1948, p. 107-108.

Design for twisting flat parts.

24a-107. The Development of Complex Patterns. A. Dickason. *Sheet Metal Industries,* v. 25, April 1948, p. 747-751.

Design and layout of several complicated sheet metal ducts and hoppers.

24a-108. Use of Sandwich Construction in Military Aircraft. Robert T. Schwartz. *Technical Data Digest,* v. 13, April 15, 1948, p. 7-12.

Construction of primary structural parts, as well as materials development projects, and determination of design criteria. "Sandwich construction" refers to any structure having relatively high-strength faces of metal or plastic, integrally bonded to a core material of low density.

24a-109. Can Castings be Engineered? F. G. Tatnall. *American Foundrymen's Association, Preprint No.* 48-45, 1948, 4 pages.

Thin-wire strain gages and strain-gage technique for analyzing strain in metal components. Brittle-lacquer technique for stress analysis in components to show where design improvements are necessary. A procedure for design improvement.

24a-110. Development and Trend in the Design of Hopper Discharge Types of Railway Cars. George A. Suckfield. *American Society of Mechanical Engineers, Paper* No. 47-A-78 (Advance Copy), 1947, 9 pages.

Weights, strengths, and other properties; costs for various metals, alloy, and wood combinations.

24a-111. The Effect of Shape and Size Factors on the Fatigue Strength. N. N. Aphanasiev. *Engineers' Digest* (American Edition), v. 5, March-April 1948, p. 132-136. Translated and condensed from "A Collection of Papers on the Dynamic Strength of Machine Parts", Institute of Practical Engineering of the Academy of Science, U.S.S.R., 1946, p. 157-167.

An analysis based on theoretical

consideration and on the literature. The theory presented makes it possible to ascertain the properties of a material by a short series of fatigue tests from which further calculations can be carried out in cases where it is possible to determine the stress gradient and the theoretical stress-concentration factor. 20 ref.

24a-112. Bending of Rectangular Plates With Large Deflections. Chi-Teh Wang. *National Advisory Committee for Aeronautics, Technical Note* No. 1462, April 1948, 34 pages.

Von Karman's equations for thin plates with large deflections are solved for special cases of rectangular plates of 1.5 and 2.0 length-width ratios under uniform normal pressure. Center deflections (to twice the plate thickness), membrane stresses, and extreme-fiber bending stresses are given as functions of pressure.

24a-113. A General Small-Deflection Theory for Flat Sandwich Plates. Charles Libove and S. B. Batdorf. *National Advisory Committee for Aeronautics, Technical Note* No. 1526, April 1948, 53 pages.

Theory is developed for elastic behavior of orthotropic flat plates in which deflections due to shear are taken into account. In this theory, a plate is characterized by seven physical constants; five stiffnesses; and two Poisson ratios, of which six are independent.

24a-114. Compressive Buckling of Simply Supported Plates With Transverse Stiffeners. Bernard Budiansky and Paul Seide. *National Advisory Committee for Aeronautics, Technical Note* No. 1557, April 1948, 20 pages.

Charts for stability under longitudinal compression of above plates with several equally spaced stiffeners having both torsional and flexural rigidity.

24a-115. Methods of Constructing Charts for Adjusting Test Results for the Compressive Strength of Plates for Differences in Material Properties. George J. Heimerl. *National Advisory Committee for Aeronautics, Technical Note* No. 1564, April 1948, 14 pages.

Methods presented take into account differences between the compressive properties of the material used for the tests and those upon which the design is to be based. Illustrative charts for extruded 24 S-T and 75 S-T aluminum alloys.

24a-116. Buckling in Shear of Continuous Flat Plates. Bernard Budiansky, Robert W. Connor, and Manuel Stein. *National Advisory Committee for Aeronautics, Technical Note* No. 1565, April 1948, 24 pages.

As basic information for the design of thin-web spars, theoretical shear buckling stress is presented for an infinitely long, clamped plate divided into square panels by rigid intermediate supports. Shear buckling stress of a plate of infinite length and width having intermediate rigid supports.

24a-117. Nonmetallic Fuel Tanks Are Favored for Aircraft. *SAE Journal,* v. 56, April 1948, p. 34-39; discussion, p. 39. Based on "Fuel Tanks—Integral Versus Bladders Versus Metal Cells," by John E. Lindberg, Frank R. Zerilli, and C. R. Ursell.

Experiences with the various types of tanks including tanks sealed with various types of adhesive materials, and those incorporating rubber cells of three different types.

24a-118. The Stresses in a Plate Containing an Overlapped Circular Hole. Chih-Bing Ling. *Journal of Applied Physics,* v. 19, April 1948, p. 405-411.

Three fundamental stress systems. Expressions of stress along the rim of the hole, and values of the maximum stress. Results are plotted in conjunction with those of a plate containing two equal circular holes.

24a-119. Progressive Die Design, Part IV. C. W. Hinman. *Modern Machine Shop,* v. 20, May 1948, p. 134-136, 138, 140, 142.

The value of "stepped dimensions" for die layout.

24a-120. Dies for Drawing Complex Shapes. Charles R. Cory. *Machinery,* v. 54, May 1948, p. 155-162.

Design of dies for parts requiring a two-way punch action or more than one drawing operation.

24a-121. Tool Engineering Ideas. *Machinery,* v. 54, May 1948, p. 182-183.

Grinding Attachment for Vertical Turret Lathe, Harold E. Murphey; and Special Chuck and Fixture for Precision Taper Boring, Donald A. Baker.

24a-122. Photo-Elastic Investigation of Stress-Relieving Fillet Curves. Everett Chapman. *Product Engineering,* v. 19, May 1948, p. 138-141.

Equipment required and preparation of photo-elastic models. Analysis of stresses in blending curves of a keyway fillet and effect of elliptical blending curves of different eccentricities.

24a-123. Selection of Engineering Materials for Coke Plants. Part II. C. F. Pogacar. *Blast Furnace and Steel Plant,* v. 36, May 1948, p. 555-559.

Wear and various types of corro-

sion as metallurgical factors to be considered in alloy selection.

24a-124. Metallurgical Aspects in the Design of Rocket Motors. J. N. Nutt. *Journal of the American Rocket Society,* March 1948, p. 31-34.

A general discussion.

24a-125. Present Day Plain Bearing Practice. W. H. Tait. *Industrial Diamond Review,* v. 8, April 1948, p. 118-122; discussion, p. 122-124. Condensed from *Journal of Institution of Production Engineers,* v. 26, March 1947, p. 75-92; April 1947, p. 111-125.

Requirements of bearing materials, properties of various materials, and design structural factors.

24a-126. The Brittle Lacquer Method of Determining Stresses. *Metallurgia,* v. 37, April 1948, p. 290-292.

Method is briefly described; compositions of brittle lacquers and some of their properties.

24a-127. Analytical Determination of Radial Cam Profiles. Gordon M. Sommer. *Tool Engineer,* v. 20, May 1948, p. 17-22.

For shops that lack special cam-machining equipment, yet are occasionally required to produce very accurate cams with such equipment as milling machines and index heads. Properly applied and used, the formulas and data given will eliminate all tedious cam layout.

24a-128. Investment Castings. W. O. Sweeney and H. L. Mattes. *Machine Design,* v. 20, May 1948, p. 91-97.

Advantages and limitations. Tips on designing better parts at reasonable cost.

24a-129. Elastic Matching Improves Bearing Life and Performance. J. G. Baker. *Machine Design,* v. 20, May 1948, p. 106-110.

An award-winning paper in the recent "Design-For-Progress Program" sponsored by The James F. Lincoln Arc Welding Foundation. Proper loading of bearings is achieved by matching the elastic deflections of bearing supports and shaft elements.

24a-130. Production Processes—Their Influence on Design. Part XXXIII—Production Grinding, Design Factors. Roger W. Bolz. *Machine Design,* v. 20, May 1948, p. 111-117.

24a-131. Cutting Production Costs? Watch Design Details! A. F. Murray. *Machine Design,* v. 20, May 1948, p. 126-128.

(Based on paper presented at recent A.S.M.E. annual meeting.)

24a-132. Designs of the Month. *Machine Design,* v. 20, May 1948, p. 146-149.

Centerless grinder ways protected by simple design; three-dimensional pantograph employs novel ratio bar; and temperature controlled electronically in automatic flame hardener.

24a-133. Calculating Deflections of Hollow Shafts in Torsion. Carl P. Nachod. *Machine Design,* v. 20, May 1948, p. 151-152.

Presents nomograph and explains its development.

24a-134. Electrical Contacts of the Strainometer in Operation. (In Russian.) G. E. Rudashevskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk.* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences.), Jan. 1948, p. 19-22.

Factors responsible for errors in the Strainometer. It was found that the main factors were defective contacts between the moving-shaft and the brushes. A series of practical remedies.

24a-135. Electrical Resistance Wire Strain Gages; Their Development and Use. (Concluded.) J. Edwards. *Metal Treatment,* v. 15, Spring 1948, p. 17-26.

The cements and adhesives required, the circuits used for measuring static, slowly varying, and dynamic stresses; and torques in shafting. 38 ref.

24a-136. Plasticity for the Aerodynamicist. William Prager. *Journal of the Aeronautical Sciences,* v. 15, May 1948, p. 253-262.

Classical theory of plasticity (Saint Venant-Mises theory) as applied to problems of plane plastic flow. 11 ref.

24a-137. Inelastic Column Theories and an Analysis of Experimental Observations. Chi-Teh Wang. *Journal of the Aeronautical Sciences,* v. 15, May 1948, p. 283-292.

The inelastic buckling problem is treated from a rigorous mathematical point of view. The effect of assuming a constant tangent modulus on the buckling load in the tangent modulus formula. Many anomalies of column behavior in the inelastic region are explained. 10 ref.

24a-138. Comparator Chart Layout Checks Involute Gears. F. E. Browning. *American Machinist,* v. 92, May 20, 1948, p. 89-92.

Quick, accurate checking of involute gears is done on a comparator with a master chart laid out by calculating points outlining tooth profile.

24a-139. Wear Resistance Measured in Laboratory and Shop. N. N. Sawin.

American Machinist, v. 92, May 20, 1948, p. 98-101.

Fundamentals of wear and its measurement. Recommends more attention to this factor in fields other than railroad rails and bearings, where it has already been extensively studied. Wear of both metallic and nonmetallic materials.

24a-140. Texturized Metals Find Wide Application. A. H. Allen. *Steel,* v. 122, May 24, 1948, p. 94-97, 119-120.

Design-strengthened sheet and strip in a wide range of metals of varying gages and degrees of hardness are found to possess improved rigidity, buckling strength, impact and tensile strength, as well as appearance.

24a-141. Experiences in the Design of Aircraft-Motor Parts and in Investigation of Their Failures. (In Russian.) R. S. Kinasoshvili. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R. 1946, p. 195-209.

A method for the computation of stresses in different parts of airplane engines. Some part failures are attributed to poor correlation between test data obtained for materials in the laboratory and true properties which are in evidence during actual operation.

24a-142. Experimental Investigation of the Strength of Metals and Joints in Construction of Electrical Machinery. (In Russian.) I. A. Oding and F. V. Kulikov. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R., 1946, p. 238-253.

The study of the phenomena of fatigue, creep, and internal stress is complicated by the existence of specific peculiarities in the design of such machinery.

24a-143. An Automotive Designer's Concept of Steel Vs. Light Metals. D. F. Toot, *Society of Automotive Engineers, Preprint,* 1948, 6 pages.

Engineering properties of aluminum, steel, and cast iron from the viewpoint of an automotive-part designer.

24a-144. The Measurement and Interpretation of Post-Yield Strains. Keith Swainger. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 1-8.

Properties of new British alloy, Minalpha (85% Cu, 12% Mn, 3% Ni), used as wire.

24a-145. On the Removal of Time Stresses in Three-Dimensional Photo-Elasticity. Max M. Frocht. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 9-13.

It was found that time stress developed in a body as a whole tends to disappear in sections cut from it if sufficient time is allowed for recovery. This release of the time stresses in sections of a body was utilized with good success in photo-elastic studies of thick slotted plates.

24a-146. Equivalence of Photo-Elastic Scattering Patterns and Membrane Contours for Torsion. D. C. Drucker and M. M. Frocht. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 34-41.

A simple theoretical derivation supported by experiment to show that photo-elastic scattering patterns can be obtained which are in every way the same as membrane contours for pure torsion. 10 ref.

24a-147. Three-Dimensional Photo-Elastic Analysis by Scattered Light. Ernesto M. Saleme. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 49-55.

A mathematical development is followed by results of experimental work on the case of a semi-infinite block under concentrated axial load.

24a-148. Stress Distribution Around a Hole Near the Edge of a Plate Under Tension. Raymond D. Mindlin. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 56-68.

A mathematical solution which shows that the stress at the point on the edge nearest to the hole is always tensile, but approaches zero as the hole approaches the edge of the plate. The calculated results are compared with those obtained by photo-elastic analysis of Bakelite models. Qualitative agreement was observed.

24a-149. Response of Damped Elastic Systems to Transient Disturbances. R. D. Mindlin. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 69-87.

A procedure, suitable for engineering applications, for taking into account energy dissipation in the various modes of flexural motion in a bar. Use of Sezawa equation.

24a-150. Electric Strain Gage Analysis of a 50-ft. Hortonsphere. Given Brewer. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, No. 2, 1948, p. 88-94.

Procedures used and results. 26 ref.

24a-151. The Photogrid Process for Measuring Strain Caused by Under water Explosions. D. D. MacLaren.

Proceedings of the Society for Experimental Stress Analysis, v. 5, No. 2, 1948, p. 115-124.

The applicability of the Eastman Kodak Transfax process. Standard techniques for the complete process by means of a series of discussions of actual test results.

24a-152. The Design and Construction of Cathode Ray Tubes. R. H. Craig. *Nickel Bulletin,* v. 21, March 1948, p. 30-33.

With choice of metals and insulating materials used in their construction.

24a-153. Impact Loading of Structures. D. Laugharne Thornton. *Engineering,* v. 165, April 30, 1948, p. 409-412.

Theoretical discussion of the effects of impact loading on various materials of construction.

24a-154. Experimental Method of Stress Analysis. J. H. Lamble. *Engineering,* v. 165, May 7, 1948, p. 436.

Simple method using a cheap, impure resin, instead of "Stresscoat" lacquer.

24a-155. The Technological Principles of Casting Design. *Machinery Lloyd* (Overseas Edition), v. 20 May 8, 1948, p. 82-85.

24a-156. Airscrew Turbines; Materials Used in the Armstrong Siddeley "Mamba". *Iron and Steel,* v. 21, May 13, 1948, p. 186-188.

Large diagram showing constructional details of new British aircraft powerplant and the alloys used in the various parts.

24a-157. Some Evaluations of Stresses in Aneroid Capsules. H. C. Grover and J. C. Bell. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, no. 2, 1948, p. 125-131.

Results from an experimental study of pressure-sensitive capsules. The primary purpose was a study of drift and mechanical hysteresis in such capsules and the development of methods for producing capsules with less drift and hysteresis than now prevalent. Two studies carried out; results of each presented and compared.

24a-158. Stresses in Two-Wire Glass-to-Metal Seals. O. Adams. *Journal of the Society of Glass Technology,* v. 32, April 1948, p. 99-112.

Behavior of glass in plane stress when examined in plane polarized light. Estimation, by Filon's graphical integration method, of the principal stresses in two-wire glass-to-metal seals.

24a-159. Rekstrookjes. (Strain Gages.) C. H. Gibbons. *Metalen,* v. 2, May 1948, p. 187-193.

Development of the SR-4 strain gage, principles of its construction and application, and limitations of different types. Ways of measuring and recording resistance of differentials. Possibilities of extension of applications.

24a-160. The Analysis of Strain and Its Graphical Representation. A. H. Willis. *Engineering,* v. 165, May 14, 1948, p. 457-460.

A mathematical presentation of value to engineers using strain-gage equipment.

24a-161. Leaf-Spring Deflection. J. E. Reeve. *Machinery* (London), v. 72, May 20, 1948, p. 624-625.

Calculations said to simplify evaluation of line integrals, in connection with article by Heller in Feb. 26 issue.

24a-162. What Kind of Information Does Brittle Coating Give? Part I. A. J. Durelli. *Product Engineering,* v. 19, June 1948, p. 86-91.

Analysis of isostatic and isoentatic patterns in brittle coatings for different combinations of stresses, and formulas enabling the calculation of stresses with higher accuracy than that usually obtained. Use of refrigerating technique to obtain isostatics in zones where the strain is smaller than strain sensitivity of coating.

24a-163. What Recent Research Offers the Designer. Norman C. Penfold. *Machine Design,* v. 20, June 1948, p. 107-112.

A broad, illustrated survey.

24a-164. Scanning the Field for Ideas. *Machine Design,* v. 20, June 1948, p. 113-115.

Electronic control equipment for Monarch lathe; bearing with spring-mounted jewel; hydraulic pitman with automatic cutout for overload; cemented-carbide inserts for wear resistance of cams on boring machine; and air-mercury sizing control for gaging the workpiece of a grinder.

24a-165. How to Reduce Costs of Thin Metal Stampings. Wallace C. Mills. *American Machinist,* v. 92, June 3, 1948, p. 99-106.

How to establish "teamwork" among processes or operations, especially when line production is involved. Results of considerable experience in investigating savings from tool designs and methods suitable to various speeds of output.

24a-166. Gear Measurement Over Nonstandard Pins—Discussion. Louis D. Martin. *American Machinist,* v. 92, June 3, 1948, p. 109-110.

Louis D. Martin, Ralph A. Miner, and R. Parks take exception to method recently described by E. J. Rantsch (Jan. 29 issue) and show other methods of calculation.

24a-167. Stability of SR-4 Electric Strain Gages and Methods for Their Waterproofing and Protection in Field Service. A. Boodberg, E. D. Howe, and B. York. *American Society of Mechanical Engineers, Advance Paper* No. 47-A-120, 1947, 5 pages.

Tests with steel blocks determine effects of time in service, changes in temperature, humidity, methods of mounting and of several waterproofing agents upon the stability of SR-4 electric strain gages; and also to determine the protecting qualities and durability of waterproofing agents and coverings that can be conveniently applied under field conditions.

24a-168. A Variational Principle of Maximum Plastic Work in Classical Plasticity. R. Hill. *Quarterly Journal of Mechanics and Applied Mathematics,* v. 1, March 1948, p. 18-28.

Classical equations of Levy-Mises and Prandtl-Reuss for an ideally plastic material. Uniqueness theorems for a completely plastic body under prescribed boundary conditions. The variational principle is applied to problem of a uniform bar of arbitrary section deformed in combined tension, torsion, and bending. 20 ref.

24a-169. The Formation and Enlargement of a Circular Hole in a Thin Plastic Sheet. G. I. Taylor. *Quarterly Journal of Mechanics and Applied Mathematics,* v. 1, March 1948, p. 103-124.

Mechanics of deformation which occurs when a circular hole is made in a flat sheet by a conical-headed bullet or by outward radial pressure on its edge, causing metal near the hole to pile up into a thickened crater.

24a-170. Theory of Plastic Flow Versus Theory of Plastic Deformation. W. Prager. *Journal of Applied Physics,* v. 19, June 1948, p. 540-543.

Typical theories and the concept of neutral change of stress. A neutral change of stress can be considered as a limiting case of either loading or unloading. Theories of plastic flow, but not those of plastic deformation, agree with the logical assumption that the stress-stain relations for both loading and unloading should predict the same change of strain for neutral change of stress.

24a-171. Strain Energy in Greatly Deformed Elastic or Inelastic Anisotropic Engineering Metals. K. H. Swainger. *Journal of the Franklin Institute,* v. 245, June 1948, p. 501-515.

Previously abstracted from *Philosophical Magazine,* series 7, v. 38, June 1947, p. 422-438. See item 24a-17, 1948.

24a-172. New Development in Gearing Studied at A.G.M.A. Meeting. *Iron Age,* v. 161, June 24, 1948, p. 79-81.

Reviews papers and discussions presented at 32nd Annual Convention, Hot Springs, Va., June 7-9, 1948.

24a-173. Design Stress Factors. Joseph P. Vidosic. *Journal of Engineering Education,* v. 38, May 1948, p. 653-658. 15 ref.

24a-174. Determination of Stresses in Gas-Turbine Disks Subjected to Plastic Flow and Creep. M. B. Millenson and S. S. Manson. *National Advisory Committee for Aeronautics, Technical Note* No. 1636, June 1948, 45 pages.

Application of finite-difference method. Calculation of stresses during one turbine-operating cycle; and stresses in a disk with a central hole. Plastic flow markedly alters elastic-stress distribution and if the amount of creep is small, the effect on stress distribution is also small.

24a-175. Metals in Service. P. M. Hess. *Iron and Steel Engineer,* v. 25, June 1948, p. 65-75; discussion, p. 75-76.

Various cases of failure, excessive corrosion, and excessive wear resulting from failure to apply scientific principles of design and selection of alloys.

24a-176. The Design of Dynamically Loaded Extension and Compression Springs. Curt I. Johnson. *Machinery,* v. 54, July 1948, p. 174-178.

Development of basic equations.

24a-177. Salient Features of Handwheel Design. (Concluded.) H. F. Williams. *Machine and Tool Blue Book,* v. 44, July 1948, p. 153-154, 156-160, 162-164, 166-167.

Positioning of handles, knobs, and knobbed handwheels on machine tools.

24a-178. Common Sense of Spring Design. Ronald F. Pond. *Iron Age,* v. 162, July 1, 1948, p. 82-85, 93.

Common errors of spring design and a number of suggestions for assuring maximum performance at minimum cost.

24a-179. Photo-Elasticity; Recent Developments in an Advanced Testing Technique. (Concluded) J. Ward. *Automobile Engineer,* v. 38, June 1948, p. 223-227.

24a-180. Piston Design; the Trend of Developments as Indicated by Current Patents. *Automobile Engineer,* v. 38, June 1948, p. 229-234.

The essential features of a series of recent British patents dealing with wear, seizing, costs, gas tightness, temperature, lubrication seal, combustion efficiency, and corrosion.

24a-181. What Kind of Information Does Brittle Coating Give? Part II. A. J. Durelli. *Product Engineering,* v. 19, July 1948, p. 133-136.

Theoretical considerations developed in Part I are applied to distribution of stresses in a ring under diametral compression. Results are checked against values given by photo-elastic studies. 20 ref.

24a-182. Fundamental Factors of Practical Die Design. S. P. Karnitz. *Tool Engineer,* v. 21, July 1948, p. 34.

24a-183. Car Body Testing Short-Cuts Stress Analysis. *SAE Journal,* v. 56, July 1948, p. 46-48. Based on **Stress Engineering as Applied to Automotive Bodies,** by Philip O. Johnson and Russell G. Heyl, Jr. (To be published in full in *SAE Quarterly Transactions.)*

Methods using strain gages to divulge magnitude of various loads and bending moments on car-door frames.

24a-184. An Optical Rectangular Rosette Extensometer for Large Strains. K. H. Swainger and J. Twyman. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, June 1948, p. 187-189.

Designed to measure both longitudinal and orthogonally transverse strains over large ranges with fairly high sensitivity.

24a-185. Relaxation Methods Applied to Engineering Problems. XIII. The Flexure and Extension of Perforated Elastic Plates. R. V. Southwell. *Proceedings of the Royal Society,* ser. A, v. 193, May 27, 1948, p. 147-171.

A mathematical analysis.

24a-186. Internal Combustion Engine Valves. *Lubrication,* v. 34, July 1948, p. 73-84.

Construction, design, materials for and lubrication of these valves. Causes of failure are classed as breakage or burning. Other topics considered are valve and ignition timing, carburetion, deposits, and maintenance practices.

24a-187. Critical Shear Stress of Plates Above the Proportional Limit. George Gerard. *Journal of Applied Mechanics,* v. 15 (*Transactions of the American Society of Mechanical Engineers,* v. 70), March 1948, p. 7-12.

The secant-modulus method previously used for determining critical compressive stresses above the proportional limit was extended for use in determining the above. The method was confirmed by experiment. Nondimensional critical-shear-stress design curves for use with Al alloys.

24a-188. Strength and Failure Characteristics of Thin Circular Membranes. W. F. Brown, Jr., and George Sachs. *Transactions of the American Society of Mechanical Engineers,* v. 70, April 1948, p. 241-249; discussion, p. 249-251.

Commercially the problem investigated relates to the design of safety diaphragms used for the protection of pressure vessels, as well as to certain structures subjected to underwater explosion or high hydrostatic pressure. The circular bulging of metal membranes also offers the possibility of investigating the fundamental properties of metal in biaxial stress and strain states. 19 ref.

24a-189. Production Processes—Their Influence on Design. Part XXXVI Roger W. Bolz. *Machine Design,* v. 20, Aug. 1948, p. 107-114, 184.

Hot extrusion of metals as applied to cable sheathings, hose casings, lead pipe, wire, and similar relatively simple cross-sectional forms and shapes of almost unlimited variety. (To be continued.)

24a-190. The Design of Dynamically Loaded Extension and Compression Springs. Curt I. Johnson. *Machinery,* v. 54, Aug. 1948, p. 159-164. (Continued.)

Tabular data and graphic representations designed to facilitate the solution of problems in compression and extension spring design.

24a-191. Details for Die Designers. Donald A. Baker. *Machinery,* v. 54, Aug. 1948, p. 175-178.

Reference sheet which shows a number of important die details that have been tried out and found to be effective in stepping up the efficiency of dies. Simple construction, easy adjustment, and maintenance of adjustment together with adaptability to standardization, are outstanding characteristics.

24a-192. Investment Castings. G. A. Stolze. *Machine Design,* v. 20, Aug. 1948, p. 139-142.

Requirements of design for proper casting.

24a-193. Uber den Einfluss der Beanspruchung auf die Bruchgefahr durch Spannungskorrosion. (The Effect of Stress on Fracture Because of Stress Corrosion.) Kurt Matthaes. *Metallforschung,* v. 2, July-Aug. 1947, p. 213-225.

Different materials that are sensitive to stress corrosion; the effect of mechanical and chemical stress; the effect of cracks, local, and alternating stress on fracturing. 13 ref.

24a-194. Fundamentals of Broaching. John A. Markstram. *Tool Engineer,* v. 11, Aug. 1948, p. 30-32.

Covers general conditions pertinent to proper design and subsequent use.

24a-195. New Principles for the Design of Machine Tool Slides. O. Lich. *Engineers' Digest,* v. 5, July 1948, p. 233-234. Translated and condensed from *Werkstatt und Betrieb,* v. 80, Oct. 1947, p. 265-267.

24a-196. The Measurement of Residual Stresses by Means of Drilling Holes. D. G. Kournossov and M. V. Jakutovich. *Engineers' Digest,* v. 5, July 1948, p. 251-253. Translated and condensed from *Zavodskaya Laboratoriya, No.* 11-12, 1946, p. 960-967.

The general case of measuring residual stresses in a plane, when neither the magnitude nor the direction of the main stresses is known. The method is based on the measurement of creep, caused by the loss of equilibrium between residual stresses due to drilling a small hole, and on the calculation of stresses made possible by that measurement.

24a-197. Automotive Designer's Concept of Steel vs. Light Metal. *SAE Journal,* v. 56, Aug. 1948, p. 59-62. Based on "An Automotive Designer's Concept of Steel vs. Light Metals", by D. F. Toot.

Previously abstracted from preprint. See item 24a-143, 1948.

24a-198. Problems of Stress Distribution in Longitudinally Welded Seams. (In Russian.) D. I. Navrotskii. *Avtogennoe Delo* (Welding), May 1948, p. 12-14.

A new theoretical method for its determination. Formulas for calculation and graphical interpretation of the proposed equations.

24a-199. Het Bepalen Van Eigenspanningen. (Determination of Internal Stresses.) W. Soete. *Metalen,* v. 2, July 1948, p. 231-245.

Because of the complexity of the X-ray method for determining internal stresses, some mechanical methods were developed which require exposure of only a small area of "inner surface". Consideration of Mathar's method (small hole plus extensometer) and the American method (strain gages) led to the development of a method combining their advantages but avoiding their drawbacks. 43 ref.

24a-200. Plastic Deformation of a Circular Diaphragm Under Pressure. A. Gleyzal. *Journal of Applied Mechanics,* v. 15. (*Transactions of the American Society of Mechanical Engineers,* v. 70), Sept. 1948, p. 288-296.

A numerical solution of a set of equations consisting essentially of three plasticity laws, two strain-displacement laws, and two equilibrium laws which describe the action of a clamped, thin, circular diaphragm as it yields plastically when pressure is applied to one side. The calculations were applied to results of a tensile test on a specimen of medium steel. 10 ref.

24a-201. Impact Extrusions—Their Design and Production. Herbert Chase. *Machinery,* v. 55, Sept. 1948, p. 168-170.

Factors to be considered in designing impact extrusions, and tolerances recommended.

24a-202. Torsion Bar Springs. Donald Bastow. *Product Engineering,* v. 19, Sept. 1948, p. 111-116.

Basic formulas for stress distribution, energy storage, spring rates, and load capacity. Material selection and heat treatment.

24a-203. Metal Stamping Design for Economy in Production. *Product Engineering,* v. 19, Sept. 1948, p. 122-123.

A series of diagrams which illustrate basic principles.

24a-204. A Simplified Polariscope for Industrial Use. Ray W. Clough. *Product Engineering,* v. 19, Sept. 1948, p. 124-128.

Equipment designed at M.I. T. for application of the photoelastic method of stress analysis.

24a-205. Electric Strain Gage Analysis of a 50-Ft. Hortonsphere. Given Brewer. *Welding Journal,* v. 27, Sept. 1948, p. 476s-480s.

Previously abstracted from *Proceedings of the Society for Experimental Stress Analysis,* v. 5, no. 2, 1948, p. 88-94. See item 24a-150, 1948.

24a-206. Stress Engineering as Applied to Automobile Bodies. Philip O. Johnson and Russell G. Heyl, Jr. *SAE Quarterly Transactions,* v. 2, July 1948, p. 468-476.

Previously abstracted from condensed version in *SAE Journal,* v. 56, July 1948, p. 46-48. See item 24a-183, 1948.

24a-207. The Design of Surface Broaches. A. Schatz. *Engineers' Digest* (American Edition), v. 5, Aug. 1948, p. 299-304. Translated and condensed from *Werkstatt und Betrieb,* v. 81, Jan. 1948, p. 1-9.

Factors influencing design and extensive design data.

24a-208. Deep Ring Analysis. Kuang-Sheng Ching. *Journal of the Aeronautical Sciences,* v. 15, Sept. 1948, p. 531-534.

Discusses "Calculation of the Stresses in Annular Frames" by H. Fahlbusch and W. Wegner, published in the Nov. 1941 issue of *Journal of the Royal Aeronautical Society.* Curved-beam theory and also direct and shear deformations are taken into consideration.

24a-209. Basic Physical Properties Relied Upon in the Frozen Stress Technique. W. A. P. Fisher. *Institution of Mechanical Engineers, Proceedings,* v. 158, Sept. 1948, p. 230-235; discussion, p. 240-250.

This method is a useful means of solving problems of three-dimensional stress by photo-elasticity. It makes use of the fact that some thermosetting resins having photo-elastic properties possess considerable residual thermoplasticity.

24a-210. Modern Applications of Photo-Elasticity. R. B. Heywood. *Institution of Mechanical Engineers, Proceedings,* v. 158, Sept. 1948, p. 235-240; discussion, p. 240-250.

Method of preparing transparent models for stress analysis; significance of the photo-elastic fringes. Procedure for developing the best shape of fillet for a particular set of conditions.

24a-211. Effective Use of Fasteners in Product Design. Louis J. Lovisek. *Iron Age,* v. 162, Sept. 23, 1948, p. 78-83, 88.

Interchangeability of bolts, plastic applications, limited-space applications, inaccessible applications, and ornamental uses, as well as a number of cases of the right and wrong type of fastener.

24a-212. Quality Control for the Designer of Coil Springs. O. G. Meyers. *Electrical Manufacturing,* v. 42, Sept. 1948, p. 86-89.

Application of statistical methods in designing products involving springs, specifying the springs themselves, and arriving at load tolerances and life requirements.

24a-213. Plaster-Mold Castings. Herbert Chase. *Electrical Manufacturing,* v. 42, Sept. 1948, p. 102-107, 202, 204, 206.

Basic design rules and standard alloys.

24a-214. Production and Inspection of Cycle Tyre Valves. *Machinery* (London), v. 73, Sept. 16, 1948, p. 431-439.

Details of design, and of machining and inspection procedures at British firm.

24a-215. Analysis of Press Performance. Given A. Brewer. *Product Engineering,* v. 19, Oct. 1948, p. 81-85.

Results of investigation of performance characteristics of a punch press under service conditions. Study of test data reveals that performance could be doubled by reducing the over-all co-efficient of friction in the bearings without changing design of other parts.

24a-216. Applying Torsion Bar Springs. Donald Bastow. *Product Engineering,* v. 19, Oct. 1948, p. 104-106.

Methods of shortening spring length and relationships between energy storage, stress level, diameter, lever length, and load.

24a-217. Rotary Contour Formed Parts. Cyril J. Bath. *Product Engineering,* v. 19, Oct. 1948, p. 117-120.

New possibilities for using one-piece metal parts having long, compound curves, such as bus bumpers, airplane cowls, and many others.

24a-218. Design for Welding. T. B. Jefferson. *Welding Engineer,* v. 33, Oct. 1948, p. 33-48.

24a-219. Research Data on Sheet-Stringer Panels. *Aviation Week,* v. 49, Oct. 4, 1948, p. 22-24.

Methods used and results of studies conducted at National Bureau of Standards for experimental confirmation of theoretical analyses.

24a-220. An Investigation of the Stress and Strain States Occurring in Bending Rectangular Bars. G. S. Sangdahl, Jr., and G. Sachs. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 1-18.

Material, equipment, and procedures. Results for plastic bending and fracturing characteristics. 29 ref.

24a-221. A New Material for Three Dimensional Photoelasticity. M. M. Leven. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 19-34.

New styrene-alkyd resin material, known as "Fosterite" and having properties for "frozen stress" tests superior to any other known material. Characteristic curves showing the variation of physical and optical properties with temperature and duration of load application for the styrene-alkyd class of resins. "Critical" and "effective" fringe value and modulus of elasticity and the factors affecting these constants.

24a-222. Some Simplifications in the Numerical Solution of Laplace's Equation With Special Applications of Photoelasticity. M. M. Frocht. *Pro-*

ceedings of the Society for Experimental Stress Analysis. v. 6, No. 1, 1948, p. 39-43.

In the method described, several straight lines are drawn through a given point in the form of a rosette. Each straight line is viewed as a taut string whose slope is determined by the boundary values of the harmonic function. The initial value of the function at a given point is taken as the arithmetic mean of all the ordinates over the given point.

24a-223. Shock Testing Technology at the Naval Ordnance Laboratory. J. H. Armstrong. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 55-65.

Equipment and procedures.

24a-224. A Photoelastic Study of Stresses in U-Shaped Members. J. B. Mantle and T. J. Dolan. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 66-73.

Results of an investigation of stress distribution; and maximum stresses in U-shaped frames with semicircular inner closed ends and rectangular outer closed ends.

24a-225. The Photoelastic Laboratory at the Newport News Shipbuilding and Dry Dock Company. Barron R. Lee, Roscoe Meadows, Jr., and Walter F. Taylor. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 83-110.

The methods and tools of photoelasticity as well as the faults and advantages of the different types of photoelastic equipment. 44 ref.

24a-226. The Equilateral Fleximeter. Given Brewer. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 123-130.

Instrument developed to permit the determination of the state of stress due to bending moments (flexure) alone at any given point on a structure. The Fleximeter used in conjunction with an equilateral strain gage rosette permits the determination of the axial stresses and the stresses on the inaccessible side of the sheet from external measurements alone.

24a-227. Determination of Stress During Plastic Torsion. (In Russian.) N. N. Davidenkov, N. G. Mokievskaya, and M. N. Timofeeva. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 720-727.

Investigates experimentally the Ludvik formula for calculation of these stresses by summation of residual and elastic stresses. Experimental procedure and obtained data.

24a-228. A Concluding Article—Flange Design Considerations. Harold E. Lonngren. *Petroleum Refiner,* v. 27, Oct. 1948, p. 145-146.

A new concept of the magnitude of the total external moment in a flange intended to explain numerous cases of failure although hydrostatic tests with as high as five times working pressure failed to show signs of weakness.

24a-229. Steel and Aluminum for Automotive Products Compared. D. F. Toot. *Materials & Methods,* v. 28, Oct. 1948, p. 69-73.

Previously abstracted from *Society of Automotive Engineers, Preprint,* 1948. See item 24a-143, 1948.

24a-230. Testing Highly Stressed Structures. W. B. Miller and E. H. Schwartz. *Product Engineering,* v. 19, Nov. 1948, p. 81-84.

Type of tests applied to aircraft structures at Wright-Patterson Air Force Base.

24a-231. Overstrength of Short Bending Members. Frederick L. Ryder. *Product Engineering,* v. 19, Nov. 1948, p. 110-112.

Stress analysis of short-beam elements. Effects contributing to overstrength. Recommended short-beam factors.

24a-232. Applying the Polariscope. Ray W. Clough. *Product Engineering,* v. 19, Nov. 1948, p. 124-128.

Construction of a simplified polariscope, adaptable for design work in small industrial laboratories, was described in an earlier article. Use of the equipment and interpretation of the data obtained.

24a-233. Sheet Metal Spools—Design and Selection. Wallace C. Mills. *Product Engineering,* v. 19, Nov. 1948, p. 143-147.

Barrel construction, head formation, assembly, and selection in accordance with end use and good sheetmetal practice. Points of weakness and strength.

24a-234. Values and Procedures of AMC's Structural Testing Program. W. B. Miller. *Technical Data Digest,* v. 13, Nov. 15, 1948, p. 19-25.

"A.M.C." is the Army's Air Materiel Command.

24a-235. Forging Die Design. The Bender. John Mueller. *Steel Processing,* v. 34, Oct. 1948, p. 527-529.

Principles of design of "benders" in drop-forging hammer dies. They are used to bring the several sections of the stock or prepared blank into proper relationship with the rougher and finisher impression.

24a-236. Stability of SR-4 Electric Strain Gages and Methods for Their Waterproofing and Protection in Field

Service. A. Boodberg, E. D. Howe, and B. York. *Transactions of the American Society of Mechanical Engineers*, v. 70, Nov. 1948, p. 915-920; discussion, p. 920-922.

Previously abstracted from *American Society of Mechanical Engineers, Advance Paper* 47-A-120, 1947. See item 24a-167, 1948.

24a-237. Prescribed-Centrifugal-Stress Design of Rotating Discs. C. M. McDowell. *Society of Automotive Engineers, Preprint*, 1948, 9 pages.

A mathematical method which may be applicable in other cases where thermal stresses are accompanied by centrifugal stresses.

24a-238. Stress Investigations in Gas-Turbine Disks and Blades. S. S. Manson. *Society of Automotive Engineers, Preprint*, 1948, 15 pages.

Information and experimental data.

24a-239. Primary Creep in the Design of Internal Pressure Vessels. L. F. Coffin, Jr., P. R. Shepler, and G. S. Cherniak. *American Society of Mechanical Engineers, Advance Paper* No. 48-PET-18, 1948, 24 pages.

Stresses and permanent strains at a particular time resulting from loading a thick-walled cylinder under constant internal pressure and elevated temperature when account is taken of the primary creep characteristics of a given material. The results are compared with permanent strains obtained by considering secondary creep as the general basis for pressure-vessel design. Methods formulated are shown to be suitable for design of pressure vessels intended for short life.

24a-240. Engineers' Problems in the Measurement of Stress and Pressure. J. G. G. Hempson, *Engineering*, v. 166, Oct. 29, 1948, p. 425-426. A condensation.

The various types of equipment used for dynamic measurements, including their applicabilities.

24a-241. X-Ray Measuring Strains in Metal. *Steel*, v. 123, Nov. 29, 1948, p. 79-80, 90.

How apparatus assembled at the National Bureau of Standards will be used in an effort to correlate progress of fatigue damage with surface strain measurements.

24a-242. Design of Machine Parts on the Basis of Their Creep Strength. (In Russian.) Yu. N. Rabotnov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 789-800.

Attempts to correlate the theory of creep with experimental data in order to determine factors to be considered in design of machine parts.

24a-243. Rocket Motors; Practical Design Problems and Their Solution. George P. Sutton. *Machine Design*, v. 20, Dec. 1948, p. 101-105.

Basic components, welding-design requirements for proper flow of coolant, effect of high heat transfer on stresses in the walls, and selection of wall material and fabrication method.

24a-244. Photoelasticity. H. T. Jessop. *British Plastics*, v. 20, Nov. 1948, p. 513-518.

Use of plastic models to investigate stress distribution.

24a-245. How to Design Levers. *Welding Journal*, v. 27, Dec. 1948, p. 1049-1051.

A variety of designs for welded levers.

24a-246. Centrifugal and Thermal Stresses in Rotating Disks. W. R. Leopold. *Journal of Applied Mechanics*, v. 15, *(Transactions of the American Society of Mechanical Engineers*, v. 70), Dec. 1948, p. 322-326.

A general semigraphical method by which stresses can be determined. A typical example is calculated.

24a-247. Stato presente e possibilita future nello studio delle sollecitazioni. (Present Status of Stress Studies and Future Possibilities.) Guido Oberti. *La Metallurgia Italiana*, v. 39, July-Aug. 1947, p. 157-166.

The basic importance of experimental stress studies. Modern test installations.

24a-248. Il volano sui laminatoi. (Rolling-Mill Flywheels.) M. Pigni. *La Metallurgia Italiana*, v. 39, Sept.-Oct. 1947, p. 213-218.

Design calculations.

24b—Ferrous

24b-1. Slitting Razor Blade Strip With Wimet. *Machinery* (London), v. 71, Nov. 20, 1947, p. 575.

Advantages and disadvantages of different designs of the fluted part. Shearing the edges of 6½-in. wide, high-carbon steel, razor-blade strip to 5¾ in. by means of Wimet slitting disks.

24b-2. Report of Committee 15—Iron and Steel Structures. *American Railway Engineering Association, Bulletin*, v. 49, Dec. 1947, p. 199-235.

Revisions of specifications for steel railway bridges; impact test results; specifications for fusion welding and gas cutting; design of expansion

joints; stress distribution in bridge frames—floorbeam hangers; design of bridge details; shortening of eyebars to equalize the stress; specifications for cold-riveted construction.

24b-3. An Alternative Form of Pressure Vessel of Novel Laminar Construction. H. Birchall and G. F. Lake. *Institution of Mechanical Engineers, Proceedings,* v. 156, Dec. 1947, p. 349-358; discussion, p. 358-367.

Advantages of novel laminar design over forged construction, which must be produced as single forgings, where the limit in regard to ingot size has already been reached. Design, construction, and testing; costs and future possibilities.

24b-4. Flame Design Considerations. Harald E. Lonngren. *Petroleum Refiner,* v. 27, Jan. 1948, p. 69-73.

A graphical method for finding the stress distribution in a flange which has been strengthened by the addition of material to provide for anticipated metal loss through corrosion or erosion.

24b-5. Strain Gage Analysis of Mechanical Punch Presses. Given Brewer. *Iron Age,* v. 161, Jan. 15, 1948, p. 66-72.

Extensive dynamic and static tests, utilizing strain gages, on mechanical punch presses. Suggests design and construction improvements for greater efficiency and strength.

24b-6. Fatigue Failure of Press Fitted Members. *Engineer,* v. 184, Dec. 26, 1947, p. 600-601.

Critically reviews recent papers.

24b-7. A Clinical Approach to Weldment Design. Gerald Von Stroh. *Steel,* v. 122, Jan. 19, 1948, p. 68-72, 106.

Failures in large welded structures. Points out that a weldment is actually one piece of metal which may have notches and incipient cracks because of necessary or unnecessary design features. Various use factors introduce uncertainties into design calculations. Recommended design changes which should minimize chances for failure are illustrated by descriptions of actual structures which have failed. (From data presented at A.S.M.E. meeting, Atlantic City, N. J., Dec. 3, 1947.)

24b-8. The Magneto-Elastic Method for Measuring Deformations and Strains in Machine Parts. (In Russian.) D. I. Volkov. *Zavodskaya Laboratoriya (Factory Laboratory),* v. 13, Sept. 1947, p. 1063-1073.

After investigating different methods, it is concluded that the magnetostriction method (change of magnetic permeability of ferromagnetic materials under stress) is most convenient and exact. Theory and practical application of this method. 10 ref.

24b-9. Antifriction Bearings. Part 5. L. E. Browne. *Steel,* v. 122, Jan. 12, 1948, p. 72-74, 100.

Some typical instances in which ball bearings exert a strong influence on the design of high-speed industrial equipment.

24b-10. Report of Committee 30—Impact and Bridge Stresses. *American Railway Engineering Association, Bulletin,* v. 49, Jan. 1948, p. 276-284.

Brief reports on the following subjects: Tests of viaduct columns; tests of steel-girder spans with open and ballasted deck; tests of dynamic shear in steel-girder and truss spans; tests of impact and bending stresses in columns and hangers of steel spans; determination of damping factors of steel spans and the variation in amount of damping with change in loading, by means of tests with an oscillator and model tests; determination of stresses and impacts in timber-stringer bridges; tests of steel-truss spans with open and ballasted deck; distribution of live load in transverse floors and longitudinal stringers; and stresses in lateral bracing of bridges.

24b-11. The Production of Favorable Internal Stresses in Helical Compression Springs by Pre-Stressing. D. G. Sopwith. *Engineers' Digest* (American Edition), v. 4, Dec. 1947, p. 558-560. Condensed from "Advance copy of Papers Presented at Symposium on Internal Stresses in Metals and Alloys", Oct. 1947, p. 195-207. Institute of Metals, London.

Results of an experimental investigation. Favorable internal or residual stresses are introduced by winding the spring somewhat longer than the required length and compressing it several times to closure. Both rectangular and circular-section springs of Si-Mn steel were investigated.

24b-12. Spring Design & Manufacture. John A. Roberts. *Wire Industry,* v. 15, Jan. 1948, p. 43-44, 47.

British research, stress-range testing, and production testing techniques. The design of helical compression springs.

24b-13. Proper Use of Spring Materials. F. P. Zimmerli. *SAE Quarterly Transactions,* v. 2, Jan. 1948, p. 157-168.

Previously abstracted from preprint. See item 24-236, R.M.L., v. 4, 1947. (Presented at S.A.E. Summer meeting, French Lick, Ind., June 2, 1947.)

24b-14. Weld Engineering Doubles Output—Cuts Cost in Half. *Modern Industrial Press,* v. 10, Jan. 1948, p. 54.

Substitutions of projection welds

for spot welds in bus-body pillar made from 13 separate stampings.

24b-15. Photo-Elastic Analysis of Stresses in Crane Ladle Hooks. F. K. Chang, K. E. Knudsen, and Bruce G. Johnston. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. 87-94.

One of the two research programs on ladle hooks being sponsored by the A.I.S.E. tells how to accurately compute bending and direct stresses in hooks.

24b-16. Determination of Compressive Stress Present in Porcelain Enamel on Sheet Iron. E. E. Bryant and M. G. Ammon. *Journal of the American Ceramic Society,* v. 31, Jan. 1, 1948, p. 28-30; discussion, p. 22.

Method consists of preparation of laboratory samples under carefully selected and controlled conditions and measurement of the warpage produced in the sample due to application of enamel on one side. Data obtained by the above method were compared with expansion curves, but failed to produce correlation between expansion as determined on frit samples and compression in the porcelain enamel as indicated by the warp of sample plates. It was concluded that expansion curves on frit samples are not suitable for evaluating compressive stress in the enamel coating.

24b-17. All-Sheet Metal Compressor Housing. *Product Engineering,* v. 19, Feb. 1948, p. 103.

The number of punch-press operations on a hermetically sealed compressor housing were reduced by designing shallower depressions in the housing shell and substituting mounting brackets, projection welded to the housing. Other material and time-saving operations.

24b-18. Ball and Roller Bearings. Bryce T. Ruley. *Product Engineering,* v. 19, Feb. 1948, p. 123-126.

Relative merits of different types of rolling-contact bearings for various operating conditions and considerations of misalignment, friction, deflection, lubrication, and operating speed that affect bearing choice.

24b-19. Flange Design Considerations —Flat and Dished Cover Plates; Flanges With Full-Faced Gaskets. Harald E. Lonngren. *Petroleum Refiner,* v. 27, Feb. 1948, p. 90-93.

24b-20. Testing of Highway Bridges. N. Davey. *Engineering,* v. 165, Jan. 23, 1948, p. 93-95.

Work of British Building Research Station especially on bridges of the cast-iron-girder and masonry-arch type up to about 40-ft. span. Certain bridges were tested to destruction by means of hydraulic jacks, using extensive instrumentation to determine deflections, stresses, and strains at each stage. On others, stresses and strains were measured under various loads customarily encountered in service. Future research is outlined.

24b-21. The Behavior of Webs of Plate Girders. S. R. Sparkes. *Welding Research,* v. 1 (Bound with *Transactions of the Institute of Welding,* v. 10), Dec. 1947, p. 4-17.

An extensive theoretical and experimental study made to define safe and economical design limits. Details of procedure and results. 10 ref.

24b-22. Methode de Calcul Simplifiée Permettant d'Etablir le Projet de Construction d'un Aimant Permanent a Grand Engrefer. (Simplified Method of Calculation Permitting Establishment of Design Factors for Permanent Magnets Having Large Air Gaps.) H. Gondet and J. Surugue. *Journal des Recherches du Centre National de la Recherche Scientifique,* No. 1, 1947, p. 23-36.

24b-23. Welded Steel Construction for Hydro-Electric Power Plants. Owen J. Aftreth and Anthony J. Perry. *Power Generation,* v. 52, Feb. 1948, p. 98, 100, 102.

Proposed new design breaks away from traditional use of concrete. Comparative details and costs for a 50,000-kw. plant. Various advantages and savings.

24b-24. Tool Design and Construction for the Apex Fold-A-Matic Ironer. Part I. Carl F. Benner. *Tool & Die Journal,* v. 13, Feb. 1948, p. 48-51.

Tooling and production will be detailed, step by step.

24b-25. Spring Design and Manufacture. Part II. John A. Roberts. *Wire Industry,* v. 15, Feb. 1948, p. 109-112.

Design calculations for internal-combustion-engine valve springs, including volute springs, a feature of which is that the coils nest inside each other when the spring is compressed. Methods used in manufacture of coiled springs.

24b-26. Bolted Assemblies. W. C. Stewart. *Machine Design,* v. 20, March 1948, p. 153-158.

Factors to be considered in specifying and applying threaded fastenings. Material selection and proper amount of torquing. 10 ref. (Based on paper presented at the recent annual meeting of S.A.E., Detroit.)

24b-27. Ferromagnetic Metals; Identification and Measurement of Internal Stresses. Part I—Magnetic Tests.

(Continued.) Albert Borowik. *Iron and Steel,* v. 21, Feb. 1948, p. 39-43.

Apparatus and necessary data. (To be continued.)

24b-28. Perforated Cover Plates for Steel Columns; Compressive Properties of Plates Having Ovaloid, Elliptical, and "Square" Perforations. Ambrose H. Stang and Bernard S. Jaffe. *Journal of Research of the National Bureau of Standards,* v. 40, Feb. 1948, p. 121-128.

Tests were made to determine the mechanical properties of perforated cover plates intended to be used as a substitute for lattice bars or batten plates in built-up box-type columns. Results for various plate designs and plate-column combinations.

24b-29. Tipo de Calculo Facilitado Para as Dimensoes de Billets ou Plantinas Geradores de Laminados Chatos. (Simplified Method for Calculation of the Dimensions of Spheres and Plates made of Rolled Sheet.) E. Orosco. *Boletim da Associacao Brasileira de Metais,* v. 3, Oct. 1947, p. 609-619; discussion, p. 619-623.

A simplified method of calculation along with formulas, tables, and graphs to facilitate the manufacture of cylinders and spheres from rolled sheets.

24b-30. Influence of the Location of Longitudinal Cracks on the Impact Strength of Tempered Spring Steel. (In Russian.) G. I. Pogodin-Alekseev. *Zavodskaya Laboratoriya,* (Factory Laboratory), v. 13, Dec. 1947, p. 1500.

A crack parallel to the direction of impact has no influence on impact strength. However, it is claimed that the strength may double when cracks perpendicular to the direction of impact are present. This indicates the possibility of increasing strength of structural parts by making them in laminated form.

24b-31. Numerical-Graphical Method of Stressing Hollow Girders. J. Lockwood Taylor. *Aircraft Engineering,* v. 20, Feb. 1948, p. 34.

Mathematics of simplified method of stressing developed from the ship-beam system and extended to axial stresses due to torsion.

24b-32. Report of Committee 5—Track. E. W. Caruthers and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 323-371.

Committee report includes separate reports on Fastenings for Continuous Welded Rail, Progress Report on Performance of Solid Manganese Crossing Frogs and Special Frog Support; Progress Report on Fatigue Tests of Manganese Steel; Design of and Stresses in Tie Plates; Hold-Down Fastenings for Tie Plates; Design, Use and Economy With Respect to Minimizing Tie Wear; and other miscellaneous reports.

24b-33. Service Tests of Various Types of Joint Bars. Ray McBrian and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 405-415.

The final report of the tests of various designs for 112 and 131-lb. R.E. rail which were installed on tangent track on the Atchison, Topeka & Santa Fe Railway and Pennsylvania Railroad in 1937. Beneficial effect of end hardening is also shown.

24b-34. Sixth Progress Report of the Rolling-Load Tests of Joint Bars. R. S. Jensen. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 416-425.

Details of results obtained during the past year at the University of Illinois.

24b-35. Corrugated Rail—Causes and Remedy; Effect Upon Riding Qualities of Tracks and Upon the Costs of Track and Equipment Maintenance. Maro Johnson and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 426-427.

Extracts from a letter from E. Bennett, civil engineer, New South Wales Railways, Sydney, Australia; and a description by Barton Wheelwright, chief engineer, of the formation and later disappearance of corrugation on a branch line of the Canadian National Railways.

24b-36. Third Progress Report on Corrugated Rails. R. E. Cramer. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 428-429.

An attempt to produce corrugation by spinning locomotive wheels. Microscopic examination of the hard bright spots of corrugations has convinced the writer that they were formed by the steel being heated to a temperature above the recrystallizing temperature, followed by fast cooling from the large mass of metal in the rail head. Short slips of a locomotive driver could develop the heat necessary to recrystallize the metal and form the corrugations.

24b-37. Development and Characteristics of Fractures Under Engine Burns in Rail Together With Investigation as to the Effectiveness of Welding up Engine Burns by Oxy-Acetylene or Electric Methods. J. B. Akers and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 429-434.

Data are tabulated, charted and discussed.

24b-38. Causes of Shelly Spots and Head Checks in Rail Surfaces; Develop Measures for Their Prevention. F. S. Hewes and Others. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 434-437.

Summarizes several more detailed reports which are being abstracted separately. The most promising developments so far appear to be use of 3% Cr steel, modified head contours, and heat treated rails.

24b-39. Sixth Progress Report of the Shelly Rail Studies at the University of Illinois. R. E. Cramer. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 437-446.

Summary of previous work and results of rolling-load tests in a special test machine. Results of observations of rails in service on the C. & O. on curved sections. Fractures of the shelly type are illustrated.

24b-40. Progress Report on Shelly Rail Studies. H. A. Blank and G. K. Manning. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 446-463.

Results of experimental work at Battelle Memorial Institute on 69 specimens. Shelled and unshelled carbon and chromium-steel rails which had been subjected to the same service conditions were examined with respect to structure, composition of residual elements, and mechanical properties. Effects of cold work on mechanical properties. Since it appears that both hardness and microstructure affect shelling resistance, and since improvement of both can be obtained by proper heat treating, heating and cooling curves were obtained for various internal locations in 113-lb. rail. This information will be useful in designing commercial equipment for heat treatment of rail.

24b-41. Effect of Bolt Spacing on Rail Web Stresses Within the Rail Joint. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 464-490.

A report of work done at University of Illinois. Also includes Fatigue Tests of Rail Webs, by R. S. Jensen, giving results of corrosion-fatigue tests using 36% H_2SO_4 on uncoated specimens and on three groups of painted specimens to test the practicability of different types of paint for corrosion-fatigue prevention.

24b-42. Fourteenth Progress Report of the Cooperative Investigation of Failures in Railroad Rails in Service and Their Prevention. R. E. Cramer. *American Railway Engineering Association, Bulletin,* v. 49, Feb. 1948, p. 490-495.

Results of examination of control cooled rails which failed in service. Also includes a summary of work reported elsewhere in this issue and in v. 47, 1946, p. 473.

24b-43. The Effect of Length on the Strength of a Steel Wire. C. Gurney and S. Pearson. *Aeronautical Research Council, Reports and Memoranda No.* 2158, (Great Britain), Nov. 1945, 13 pages.

Sets of strength tests on two lengths cut from the same coil of steel wire were made, each set consisting of about 100 tests on nominally indentical test pieces. Results were compared with those predicted by statistical theory assuming that a normal distribution of strength would be obtained for a unique, but initially unknown, length of wire, and that the strength of the wire is statistically homogeneous. The experiments show small, but significantly different distributions of strength of the long and short wires, the general trends of the results being in agreement with theory.

24b-44. What Can Be Recommended to Overcome the Cracking of Boiler Shells at the Riveted Seams and Other Places, Which Develop in Our Present Day Steam Locomotive Boilers. *Master Boiler Makers' Association, Official Proceedings of the 1947 Annual Meeting,* 1947, p. 235-249; discussion, p. 249-258.

A committee report. Photographs and photomicrographs show various service failures which were thoroughly studied to determine causes and remedies. Makes recommendations for design changes to minimize these failures, and also for future work.

24b-45. A New Type of Firebox Construction. Howard L. Miller. *Master Boiler Makers' Association, Official Proceedings of the 1947 Annual Meeting,* 1947, p. 267-278; discussion, p. 278-282.

New design utilizing a Cr-stainless steel known as Enduro AA or A.I.S.I. 430 in welded construction. Comparative Charpy impact values for this steel and for the steel usually used.

24b-46. The Effect of Nonuniform Distribution of Stress on the Yield Strength of Steel. Dimitry Morkovin and Omar Sidebottom. *Engineering Experiment Station, University of Illinois,* Bulletin Series No. 372 (v. 45, no. 26), Dec. 18, 1947, 74 pages.

Experimental results show that, except to a small degree in one specimen, the stress required to start yielding in the presence of a stress gradient was not higher than was required in a uniform stress field. Part I deals mainly with the beginning of yielding in members with nonuniform stress distribution when the material does not exhibit an upper yield point. Part II considers the effect exerted on the beginning of yielding by an upper yield point in addition to a stress gradient.

24b-47. The Behavior of Stanchions Bent in Double Curvature. J. F. Baker and J. W. Roderick. *Welding Research,* v. 2, Feb. 1948, p. 2r-24r. (Bound with *Transactions of the Institute of Welding,* v. 11.)

5th Interim Report of FE. 1 Committee on Load-Carrying Capacity of Frame Structures of the British Welding Research Assoc. is illustrated with photographs and diagrams showing the test equipment.

24b-48. Balanced Forces in High Pressure Pumps. Ralph G. Paul. *Western Machinery and Steel World,* v. 39, March 1948, p. 86-89, 115, 126.

Design and fabrication of new type of centrifugal pump used for generating hydraulic power. Produced by Byron Jackson Co., Los Angeles.

24b-49. Large Plastic Flow and the Collapse of Hollow Cylinders. P. W. Bridgman. *Journal of Applied Physics,* v. 19, March 1948, p. 302-305.

The collapse of heavy steel cylinders under external pressures running up to 412,000 psi. was studied during the war under contract with Watertown Arsenal. The distortions are so large that conventional small-strain analysis is not adequate. The presence of large strains is recognized in the analysis by writing the stress equations of equilibrium in terms of the final displaced positions of the particles instead of in terms of the initial positions. Results indicate that strain hardening increases continually with increasing distortion, but at a rate two or threefold less than would be given by experiments in simple tension.

24b-50. Hoisting Rope Research in Ontario Mines. R. E. Dye, R. D. Parker, and R. L. Healy. *Canadian Mining and Metallurgical Bulletin,* v. 41, March 1948, p. 158-171.

Research program and progress to date. Study of the occurrence and causes of the various forms of rope and wire deterioration with particular emphasis on causes and prevention of corrosion; development of improved lubricants and methods of application; microscopic and metallographic studies of the steel in the wire; detection of the presence of corrosion and other deteriorating influences by nondestructive methods; results of tensile tests made on discarded hoisting ropes; and a study of mechanical features of hoisting installations. (To be presented at annual meeting, Canadian Institute of Mining and Metallurgy, Vancouver, B. C., April 1948.)

24b-51. Latest Lubrication Developments Applied to World's Fastest Cold Strip Mill. *Steel,* v. 122, March 29, 1948, p. 86, 89.

Recently installed 36-in., continuous, five-stand, tandem, cold reduction mill at the Aliquippa plant of Jones & Laughlin Steel Corp., which utilizes four separate lubrication systems.

24b-52. Ferromagnetic Metals; Identification and Measurement of Internal Stresses. Part I — Magnetic Tests. (Continued.) Albert Borowik. *Iron and Steel,* v. 21, March 1948, p. 81-86.

Sources and magnitude of errors in magnetic measurements. Existing methods for calculation of stresses from results of magnetic measurements. Magnetic data previously presented in this series are plotted on three-dimensional diagrams. These show variation of coercive force and energy loss due to hysteresis with degree of cold work; stresses produced by external loads in wires of various carbon contents which had been cold-worked and stress relieved; and variation in maximum induction, remaining induction and maximum magnetic permeability with degree of cold work and stress. Conclusions resulting from study of the diagrams.

24b-53. Tubular Air Heaters of Welded Construction. A. N. Clark, James Longhray, and W. Denovan Garrick. *Engineer,* v. 185, March 19, 1948, p. 289-292; March 26, 1948, p. 313-315.

Four medium-sized, tubular, air heaters designed and fabricated for a large water-tube boiler installation. Structural details are clarified by numerous photographs and diagrams. Cost data are also discussed and charted.

24b-54. Die Casting Die Design. Part I. (Continued): Square and Rectangular Ejector Pins; Methods of Ejection Other Than by Ejector Pins; Air Ejection; Dimensioning the Pin. *Tool & Die Journal,* v. 14, April 1948, p. 56, 58-60, 62, 84.

Design of these features.

24b-55. Design and Construction of Staybolted Fireboxes. F. P. Huston. *Railway Mechanical Engineer,* v. 122, April 1948, p. 65-69, 80. A condensation.

Minor changes in design and use of new alloys are suggested as means to improve locomotive firebox performance. (Presented at meeting of Railroad and Metals Engineering Divisions, A.S.M.E., Atlantic City, Dec. 2, 1947.)

24b-56. Internally Insulated Pressure Vessels, Piping, for High Temperature Service. P. E. Darling. *Petroleum Processing,* v. 3, April 1948, p. 339-340, 342, 344.

Application of internal insulation has made possible satisfactory and economical construction of vessels and piping for a number of processes where the requirements of large lines and vessels for high-temperature service make the use of suitable alloy steels uneconomic. Results obtained with various alloy, ceramic, and plastic combinations.

24b-57. Dimensional Instability Affects Design of Precision Equipment. Parts III and IV. Frederick C. Victory. *American Machinist,* v. 92, March 25, 1948, p. 112-115; April 8, 1948, p. 112-115.

Suggestions for steels possessing good stability after customary heat treatment, and a simple test for use after tempering. Residual and applied stresses play very important parts in stability and functioning of machine elements.

24b-58. Ferromagnetic Metals; Identification and Measurement of Internal Stresses. Part I — Magnetic Tests. (Concluded.) **Part II—Mechanical Tests.** Albert Borowik. *Iron and Steel,* v. 21, April 1948, p. 117-121.

Basic principles, equipment, sample shapes, and calculation of proper strain rates in mechanical testing. Tables and charts illustrate the calculation of internal stresses. 20 ref.

24b-59. Notes on the Design and Construction of Staybolt Locomotives. Fred D. Huston. *American Society of Mechanical Engineers, Paper* No. 47-A-59 (Advance Copy.), 1947, 17 pages.

Previously abstracted from condensed version, *Railway Mechanical Engineer,* v. 122, April 1948, p. 65-69, 80. See item 24b-55, 1948.

24b-60. Freight Car Truck Progress. Robert Boyd Cottrell. *American Society of Mechanical Engineers, Paper* No. 47-A-71 (Advance Copy), 1947, 13 pages.

Improvements in design and metallurgy. Mechanical-test data.

24b-61. Flexural Fatigue Strength of Steel Beams. Wilbur M. Wilson. *Engineering Experiment Station, University of Illinois, Bulletin Series No.* 377 (v. 45, No. 33), Jan. 22, 1948, 34 pages.

The principal purpose of the investigation was to determine the relative fatigue strengths of various kinds of flexural members. The fatigue tests were supplemented by static tests of similar specimens. Specimens tested included numerous combinations.

24b-62. Progress Reports of Investigation of Railroad Rails and Joint Bars. R. E. Cramer, N. J. Alleman, and R. S. Jensen. *Engineering Experiment Station, University of Illinois, Reprint Series No.* 37 (v. 44, No. 46), March 28, 1947, 47 pages. Reprinted from *American Railway Engineering Association, Bulletin,* v. 48, Feb. 1947.

24b-63. Cleavage Fracture of Ship Plates as Influenced by Size Effect. Wilbur M. Wilson, Robert A. Hechtman and Walter H. Burckner. *Welding Journal,* v. 27, April 1948, p. 200s-207s; discussion, p. 208s. Condensed from a report to Bureau of Ships, U. S. Navy.

Tests were made on ¾-in. plates with nominal widths of 72, 48, 24, and 12 in. Average static strength; energy-absorbing capacity; V-notch impact value as an indicator of performance of the wide plate test, distribution of plastic deformation at the ends of the stress raiser prior to maximum load; temperature-elongation relation; and reduction in thickness of the plates.

24b-64. Prevention of Mechanical Failures in Steel Plant Equipment. Oscar J. Horger and Gordon A. Stumpf. *Iron and Steel Engineer,* v. 25, May 1948, p. 69-76; discussion, p. 77.

Many failures may be prevented by correct initial designs which reduce stress concentrations. Cold working to introduce residual stresses at critical points will eliminate many more breaks. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 25, 1947.)

24b-65. Trends in Design and Application of Lifting Magnets. John D. Leitch. *Iron and Steel Engineer,* v. 25, May 1948, p. 78-86; discussion, p. 87-91.

New electric magnet in a welded design gives a sealed unit which prevents the entrance of moisture, and allows the design of a flatter coil which aids in heat dissipation. Uses in steel industry. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Pa., Sept. 23, 1947.)

24b-66. Tendency Toward Shaft Failures in Marine Steam Engines. (In Russian.) V. A. Anichkov. *Collection*

of Reports Concerning the Dynamic Strength of Machine Parts, Academy of Sciences of the U.S.S.R., 1946, p. 210-219.

Need for investigation of factors causing such failures and results of this investigation.

24b-67. Failures of Seagoing Ship Propellor Shafts. (In Russian.) A. V. Efimov. *Collection of Reports Concerning the Dynamic Strength of Machine Parts,* Academy of Sciences of the U.S.S.R., 1946, p. 220-224.

Specific operating conditions and main factors responsible for failures which are said to be quite different from those involved in stationary-engine operation. Suggestions for preventing failures.

24b-68. Mechanical Properties of Metals and Strength of Axles. Railroad Rolling Stock in Service. (In Russian.) V. N. Makhov. *Collection of Reports Concerning the Dynamic Strength of Machine Parts.* Academy of Sciences of the U.S.S.R., 1946, p. 225-237.

It is stated that the majority of above failures are caused by overloading and by poor impact strength of the steels used. Recommends drastic revision of existing specifications.

24b-69. Allowable Stresses for Steel Members of Finite Life. G. C. Noll and M. A. Erickson. *Proceedings of the Society for Experimental Stress Analysis,* v. 5, no. 2, 1948, p. 132-143.

Data in the form of diagrams for solution of practical structural problems. Effects of number of stress cycles, of mode of stress variation, of surface finish, and of stress concentration in arriving at the final diagrams.

24b-70. Fatigue Tests of Welding Elbows and Comparable Double-Mitre Bends. A. R. C. Markl. *Welding Journal,* v. 27, June 1948, p. 310s-320s.

Previously abstracted from *Transactions of the A.S.M.E.,* v. 69, p. 869-876. See item 24-403, R.M.L., v. 4, 1947.

24b-71. Some Characteristics of Residual Stress Fields During Dynamic Stressing Above the Endurance Limit. James B. Duke. *American Society for Testing Materials, Preprint* No. 30, 1948, 8 pages.

Investigation on samples of S.A.E. 1020 and S.A.E. 4130 steel using a comparative magnetic process to determine both fatigue damage and direction and relative magnitude of residual stress fields set up during endurance life of the metal. Results indicate that valuable information on progress of plastic deformation due to differential cold working, prediction of failure from fatigue, and several magnetic properties not easily measured can be obtained regardless of heat treatment or composition of the steel.

24b-72. Concerning Stress Conditions in a Round Iron Plate With Definite Crystal Structure During Deep Drawing. Part I. (In Russian.) K. V. Grigorov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 175-186.

The azimuthal distribution of stresses was calculated for different types of crystal structures. It was found to be highly anisotropic and independent of structure. 12 ref.

24b-73. Laboratory Measurements of Stress Distribution in Reinforcing Steel. Douglas McHenry and W. T. Walker. *Journal of the American Concrete Institute,* v. 19, (*Proceedings,* v. 44), June 1948, p. 1041-1054.

Typical laboratory test results on stress distribution of simple reinforced beams before and after cracking, and comparison of these results with stresses computed by conventional methods. Possible applications of the gaging method as well as to its limitations.

24b-74. Standardized Welded Connections Cut Costs for Research Building. La Motte Grover. *Engineering News-Record,* v. 140, June 24, 1948, p. 89-91.

Use in structural frame.

24b-75. Evolution in Chilled Wheel Rims. *Railway Age,* v. 124, June 26, 1948, p. 86-87.

Development of improved structures which have reduced failures for comparable service for wheels cast in 1944 to one-third as many as occurred in those cast in 1930-1939. Experimental design for increased flange and rim strength.

24b-76. The Effect of Section Size on the Fracture Strength of Mild Steel. E. R. Parker. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40 B), 1948, p. 82-89.

Effect of section size on the fracture strength of following steel specimens: cylindrical specimens; unnotched flat plates; notched flat plates; geometrically similar specimens; and welded assemblies.

24b-77. Evaluation for Structural Design of Laboratory Data on Flow and Fracture of Steel. Wendell P. Roop. "Fracturing of Metals", American Society for Metals (also *Transactions of American Society for Metals,* v. 40 B), 1948, p. 133-146.

Problems introduced by the fact

that members whose design for strength is more than adequate nevertheless are subject to failure. Indicates that the essential problem is one of obtaining a satisfactory test for ductility and then finding how much of it is needed by a given structure in a given service. General features of three types of test which should be developed.

24b-78. Spring Design and Manufacture. Parts I and II. John A. Roberts. *Wire and Wire Products,* v. 23, June 1948, p. 479-483; July 1948, p. 583, 586-588, 624-626.

Previously abstracted from *Wire Industry,* v. 15, Jan. 1948, p. 43-44, 47; Feb. 1948, p. 109-112. See item 24b-12, 1948.

24b-79. The Mechanics of Locked-Coil Wire Ropes. J. A. L. Matheson. *Engineering,* v. 165, June 18, 1948, p. 578-581. June 25, 1948, p. 601-604.

Manufacture of these ropes, and a dead-weight tester developed for their investigation. In most previous tests, both ends were secured; however, in the tests described, one end was free to rotate. Test results, both for extension and for untwisting.

24b-80. Progressive Die Design. Part VII. C. W. Hinman. *Modern Machine Shop,* v. 21, Aug. 1948, p. 170-172, 174, 176.

An intricate progressive die which is designed to form flat steel blanks into cylinders.

24b-81. How to Choose the Proper Wire-Rope Construction. W. I. Lex. *Power,* v. 92, Aug. 1948, p. 79-81.

Designs for flexibility and strength, and for high resistance to abrasion, corrosion, and bending fatigue. Applications for each type that gives satisfactory service. Nonpreformed and preformed rope are compared.

24b-82. Research Work on Rail Sections. Walter Leaf. *Transactions of the American Society of Mechanical Engineers,* v. 70, Jan. 1948, p. 31-35.

As a result of a failure in 112-lb. rail on mainline track of the D. & R.G.W., studies of fatigue failure of rails were undertaken. Faulty rail design was found to be the cause of failure. From this work and that of the A.R.E.A., new rail designs have been evolved.

24b-83. The 103,000-Hp. Turbines at Shasta Dam. J. F. Roberts. *Transactions of the American Society of Mechanical Engineers,* v. 70, April 1948, p. 217-224; discussion, p. 225-226.

Details of design and mechanical properties of welded and riveted joints used in different locations. Fabrication and testing procedures.

24b-84. Future Developments in Welded Steel Buildings. Arsham Amirikian. *Welding Journal,* v. 27, Aug. 1948, p. 593-599.

The problems of design with particular reference to welded steel structures. The elements of a new articulated wedge beam framing.

24b-85. Effect of Residual Tension Stress on the Fatigue Strength of Mild Steel. L. D. Hall and Earl R. Parker. *Welding Journal,* v. 27, Aug. 1948, p. 421s-425s.

Static tests of welded structures are made with the object of determining conditions under which residual stresses may contribute to fracture. The large amount of laboratory testing has failed to show that residual welding stresses decrease the static fracture strength of mild steel.

24b-86. Designing Castings in Gray Iron. Charles O. Burgess. *Foundry,* v. 76, Sept. 1948, p. 100-101, 224, 226.

Difficulties experienced and suggestions for overcoming design problems.

24b-87. Strength of Large Bolts. Jonathan Jones. *Fasteners,* v. 5, no. 2. 1948, p. 12-13.

On the basis of experiments on 3½-in. threaded rods made for use on a 10-million cu. ft. gas holder, it is shown that on large bolts the effect of Poisson's ratio may, in some cases, be great enough to contract the cross-sectional area a sufficient amount to overload and cause thread failure.

24b-88. Design for Welded Stampings Reduced Cost of Paper Punches. *Product Engineering,* v. 19, Sept. 1948, p. 96.

Paper punches are sold for approximately one third the price of those using castings. Material is cold rolled steel.

24b-89. Nomogram for Designing Steel Torsion Springs. Carl P. Nachod. *Product Engineering,* v. 19, Sept. 1948, p. 167, 169.

24b-90. Calculation of Torsional Vibration Stresses in Large Power Plants. A. F. Gogin. *Engineers' Digest* (American Edition), v. 5, Aug. 1948, p. 285-286. Translated and condensed from "Collection of Reports Concerning Dynamic Strength of Machine Parts", Academy of Sciences of the U.S.S.R., Moscow, 1946, p. 44-51.

Previously abstracted from original source. See item 27a-90, 1948.

24b-91. Current Practice in Tractor Transmission Gears. Wayne H. Worthington and Barrett G. Rich. *SAE Quarterly Transactions,* v. 2, July 1948, p. 379-387; discussion, p. 387-389, 400.

Gearing of 11 tractor transmissions under the following headings: basic gear systems in use; gear-form modifications and methods of final finishing; materials and heat treatment; surface compressive stresses; and beam stresses.

24b-92. Theory of Plasticity—Elements of Simple Theory. J. W. Roderick. *Philosophical Magazine,* ser. 7, v. 39, July 1948, p. 529-539.

Elements of the simple theory of flexure, for mild-steel members in the elasto-plastic condition, and extends it to cover the case of bending combined with axial loading.

24b-93. Collapse Resisting Strength of Iron Pipe or Tube. *Asbestos,* v. 30, Sept. 1948, p. 30, 32.

Chart for above and its use.

24b-94. Concerning the Prevention of Deformation in Welded Ship Structures. (In Russian.) R. V. Vroblevskii. *Avtogennoe Delo* (Welding), July 1948, p. 25-26.

Factors causing deformation. A series of suggestions are proposed.

24b-95. Design Considerations for Welded Machinery Parts. Part Two. George L. Snyder. *G. E. Welding Arcs,* v. 14, Oct. 1948, p. 10-14.

24b-96. Stamped Cover Reduces Breakage. *Product Engineering,* v. 19, Oct. 1948, p. 101.

Drawn-steel cylinder covers were adopted for heavy-duty diesel engines to reduce breakage during servicing. Former aluminum castings broke when dropped but the steel stampings are easily hammered back into shape if dented.

24b-97. Modern Trends in Hydraulic Turbine Design. William J. Rheingans. *Electrical Engineering,* v. 67, Oct. 1948, p. 954. Condensed from paper to be published in *AIEE Transactions,* v. 67, 1948.

Use of welded-plate construction and of stainless steel, also self-lubricating bearings and carbon-seal rings.

24b-98. Safe Structural Loads Concentrated at Mid-Spans of Laterally Unsupported Members. *Factory Management and Maintenance,* v. 106, Oct. 1948, p. 132, 134.

Design charts for standard steel structural members.

24b-99. Advance Report of the Committee on Impact and Bridge Stresses. *American Railway Engineering Association, Bulletin,* v. 50, Sept.-Oct. 1948, p. 51-146.

Stresses in a number of different types of bridges were determined during passage of trains and locomotives of different weights. Results are reported in the eight separate reports within the main report.

24b-100. Design and Fabrication of Welded Light-Weight Pressure Vessels. John J. Chyle. *Welding Journal,* v. 27, Oct. 1948, p. 831-837.

Methods for three broad groups of the above vessels. Mechanical properties of the metals used and of their welds. Test procedures and results. Inspection and heat treating methods.

24b-101. Heavy Flexible Beam and Girder Connections. Harry Greaves. *Welding Journal,* v. 27, Oct. 1948, p. 845-849.

Design of all-welded fluid-catalytic-cracking plants. They are 220 ft. high, 43 ft. wide and 126 ft. long. The regenerator vessel weighs 2,-175,000 lb.

24b-102. The Future Welded Design of Farm Equipment. Ernest J. Koop. *Welding Journal,* v. 27, Oct. 1948, p. 850-854.

Recommended series of improvements in design of farm machinery which still is largely assembled by use of bolts and rivets.

24b-103. Zur Dauerhaltbarkeit von Formelementen der Welle bei ueberlagerter wechselnder Biege- und Verdrehbeanspruchung. (The Effect of Shaft Design on Fatigue Strength Under Superimposed Alternating Bending and Torsional Stresses.) O. Puchner. *Schweizer Archiv fuer angewandte Wissenschaft und Technik,* v. 14, Aug. 1948, p. 217-229.

Tests were made on normalized carbon steel and drawn Mn-Si steel, each of which was machined into different shapes. 11 ref.

24b-104. Flanged Joint Design for Welded Tubular Steel Structures. Grant A. DeShazer. *Product Engineering,* v. 19, Nov. 1948, p. 117-118.

24b-105. Welded Warehouse Building. *Welding Engineer,* v. 33, Nov. 1948, p. 64.

24b-106. Engineering and Production Ingenuity Behind the Creation of a Fastener. Dan Reebel. *Steel,* v. 123, Nov. 8, 1948, p. 90-94, 124.

Elimination of a simple joining operation plus the realization of substantial savings in assembly labor costs are being experienced by a prominent automotive manufacturer through use of a new type door-lock cylinder retainer. Details of design and production methods.

24b-107. Design for Manufacturing Automobile Bodies. Walter A. Graf. *SAE Quarterly Transactions,* v. 2, Oct. 1948, p. 507-517.

The many activities involved in

designing, making and assembling steel automobile bodies. Preparation of the full-size layouts, hardwood die models, and making of dies and assembly tools, plaster cases, patterns, and the cerrobend frame-checking fixtures.

24b-108. Causes and Prevention of Drill Pipe and Tool Joint Troubles. Part 2. Drill Pipe. (Continued.) H. G. Texter, R. S. Grant, and S. C. Moore. *World Oil,* v. 128, Nov. 1948, p. 124, 126, 128, 132.

Various causes of notch-fatigue failures.

24b-109. The Behavior of Prestretched Structural Steel Beams. R. L. Buchwalter and Y. C. Shiu. *Welding Journal,* v. 27, Nov. 1948, p. 522s-528s.

Results of several experiments conducted at Iowa State University. Results indicate that use of prestretched beams may permit use of higher allowable design stresses.

24b-110. Progress Report No. 1: Welded Continuous Frames and Components. Plastic Behavior of Wide Flange Beams. W. William Luxion and Bruce G. Johnston. *Welding Journal,* v. 27, Nov. 1948, p. 538s-554s.

Extensive experimental results.

24b-111. Design and Fabrication of Welded Lightweight Pressure Vessels. J. J. Chyle. *Journal of the American Rocket Society,* Sept.-Dec. 1948, p. 90-106.

Previously abstracted from *Welding Journal,* v. 27, Oct. 1948, p. 831-837. See item 24b-100, 1948.

24b-112. Bending Tests of Large Welded-Steel Box Girders at Different Temperatures. Ambrose H. Stang and Bernard S. Jaffe. *Journal of Research of the National Bureau of Standards,* v. 41, Nov. 1948, p. 483-495.

Tests were made to determine the effect of constraint caused by geometrical shape and by differences in temperature on the ductile behavior of welded structures. The girders were tested as simply supported beams, one being tested at each of the following temperatures: —40, 0, 40, and 80° F.

24b-113. Stronger Punch Press Frames, Less Strain as a Result of Strain Gage Testing. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 147-148, 150, 152, 154, 156.

Experiences of Diamond Machine Tool Co.

24b-114. Collet-Chuck Spanner Wrenches Redesigned for Ease of Manufacture. T. B. Hall. *Machinery,* v. 55, Dec. 1948, p. 186.

New wrenches are made from heavy-gage tubing by machining and welding. Cost savings over punched wrenches.

24b-115. Alloy Steels Increase Shovel Capacity. *Product Engineering,* v. 19, Dec. 1948, p. 90-92.

How modified armor-plate steels were used to increase the capacity of Type 5561 Marion shovels from 35 to 40 cu. yd. Cutting effort at tip of dipper was increased 33% and operating range was also increased.

24b-116. Design of Surface Broaching Tools. *Machinery* (London), v. 73, Nov. 25, 1948, p. 733-737. Translated and condensed from article by Artur Schaltz, *Werkstatt und Betrieb,* v. 81, no. 1, 1948.

24b-117. Reinforced Cast Iron. Eugen Piwowarsky. *Iron Age,* v. 162, Dec. 9, 1948, p. 92-96; Dec. 16, 1948, p. 99-101. Translated and condensed from the German.

Reinforcement with cast-in steel inserts offers interesting possibilities for weight and material savings in structural shapes, pipe, and other applications. Increases in strength obtainable by this technique, and the effectiveness of various types of reinforcing media and pouring methods. Comments on Russian work.

24b-118. Röntgenspannungsmessungen an Stählen mit verschiedenem Kohlenstoffgehalt und unterschiedlicher Gefugeausbildung. (X-ray Stress Determinations on Steels With Different Carbon Contents and Different Structures.) Franz Bollenrath and Viktor Hauk. *Metallforschung,* v. 1, Dec. 1946, p. 161-167.

The method used and results for three carbon steels. 39 ref.

24c—Nonferrous

24c-1. Lubricants and Bearings for Turbines. F. C. Linn. *Lubrication Engineering,* v. 3, Dec. 1947, p. 71-75.

Lubricating systems used by General Electric. Viscosity requirements; recommended types of oil; selection of materials for, and design of, bearings.

24c-2. Designing Thoriated Tungsten Filaments. H. J. Dailey. *Electronics,* v. 21, Jan. 1948, p. 107-109.

Design data for carburized thoriated tungsten filaments are calculated using formulas applicable to filaments of pure tungsten. Procedure requires controlled carburization to give carburized and uncarburized filaments having similar electrical characteristics.

24c-3. Adjustment Pays Off. Max Boehm. *Die Castings,* v. 6, Feb. 1948, p. 23, 43-44.

How a small subassembly, for

many years made of brass tubing and a steel cam, is now die cast in zinc, saving $7 per thousand pieces.

24c-4. Sparking Sales. *Die Castings,* v. 6, Feb. 1948, p. 24-26, 45-49.

Construction of spark-plug cleaner and tester, built to withstand pressures up to 300 psi., almost entirely of zinc die castings.

24c-5. Design of a Magnetic Jig Saw. *Die Castings,* v. 6, Feb. 1948, p. 27-28, 49-51.

Adjustment of each unit was a bottleneck in this assembly line until zinc die castings provided a means for precision assembling. In redesigning, the total number of parts was reduced from 41 to 24.

24c-6. Design Stresses for Beryllium-Copper Parts. Robert W. Carson. *Electrical Manufacturing,* v. 41, March 1948, p. 76-80, 176.

Maximum allowable working stresses for three age hardening alloys of beryllium copper suitable as spring materials depend to a large extent upon the amount of cold work done upon the material between the solution anneal at the mill and the final heat treatment at the fabricator. 18 ref.

24c-7. Conductor Vibration Studies on Energized 230-Kv. Lines. M. G. Poland and M. B. Elton. *Electric Light and Power,* v. 26, March 1948, p. 48-53.

Recording instruments used by the Bonneville Power Administration in the field measurement of conductor vibration; recent experience with fatigue damage. (Presented at General Meeting, A.I.E.E., Aug. 1947.)

24c-8. Flexible Tubing With a High Strength "Double Hook". *Inco,* v. 22, Spring 1948, p. 18.

Production of flexible monel tubing having unique high-strength design capable of withstanding pressures up to 7000 psi.

24c-9. Proposal: Die Cast Sprayer Nozzles. L. Wayne Lauver. *Die Castings,* v. 6, April 1948, p. 37-38.

Present and proposed designs. Advantages of latter.

24c-10. Designing for Silver Brazing by Induction Heating. Frank W. Curtis. *Product Engineering,* v. 19, Aug. 1948, p. 109-113.

Design relationships, placement of parts, clearance between surfaces, relative position of silver alloy and heating coils.

24c-11. Redesign of a Washing Machine Transmission. Leo J. Wubbe. *Die Castings,* v. 6, Sept. 1948, p. 25-26, 66-69.

Permanent-mold transmission housings have given way to die-cast zinc to reduce scrap losses due to excessive porosity, and to eliminate machining operations.

24c-12. Designing for Die Casting. H. C. Snyder, B. E. Sandell, L. E. Capek, and G. Nielsen. *Product Engineering,* v. 19, Oct. 1948, p. 86-91.

Important factors include choice of material, size, shape, dimensional tolerance, and pressure requirements.

24c-13. Nonferrous Powdered Metal Parts. D. C. Bradley. *Product Engineering,* v. 19, Oct. 1948, p. 107-109.

Typical machine elements pressed from copper, brass, or nickel silver. Some cost less or are more accurate than competitive parts; others have improved electrical characteristics.

24c-14. Die Cast Air Motor. *Die Castings,* v. 6, Nov. 1948, p. 21-22, 58.

Cumulative tolerances and center distances are held within close limits to eliminate gaskets and sealing compounds. Zinc die castings are used for plates, cylinders, pistons, and valves.

24c-15. Aluminum-Copper Cable Connections for Outdoor Stations. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 388. Translated and condensed from *Revue de l'Aluminium,* v. 25, Feb. 1948, p. 65.

New design which is less susceptible to corrosion.

24c-16. Die Casting Die Design. Part II. Movable Cores, Multiple Core Head Slides; Mechanical and Hydraulic. H. K. Barton and James L. Erickson. *Tool & Die Journal,* v. 14, Dec. 1948, p. 52-54, 56-57, 72.

(To be continued.)

24c-17. How to Save on the Cost of Die Castings by Proper Design and Specification. James L. Erickson. *Materials and Methods,* v. 28, Dec. 1948, p. 65-69.

Some of the factors involved.

24d—Light Metals

24d-1. An Analysis of Simplified All-Metal Wing Structures. David J. Peery. *Aero Digest,* v. 56, Jan. 1948, p. 38-40, 104.

Stresses and strains in simplified vs. conventional forms.

24d-2. Determination of Plate Compressive Strengths. George J. Heimerl. *National Advisory Committee for Aeronautics, Technical Note* No. 1480, Dec. 1947, 19 pages.

Results of local-instability tests of H, Z, and C-section plate assemblies of four extruded aluminum alloys

and two magnesium alloys. On the basis of the general relationships found between plate compressive strengths and compressive stress- and compressive stress-strain curves, methods applicable to flat plates and based upon the use of the compressive stress-strain curve are suggested for determining the critical compressive stress and the average stress at maximum load.

24d-3. Methods for Determination of Corrosion Resistance of Light Alloys Under Stress. (In Russian.) S. E. Pavlov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, Oct. 1947, p. 1234-1244.

Methods used in the U.S.S.R. and elsewhere, the different test apparatuses and methods, and the results obtained. 11 ref.

24d-4. Preliminary Data on Buckling Strength of Curved Sheet Panels in Compression. Eugene E. Lundquist. *National Advisory Committee for Aeronautics, Wartime Report No.* L-690, Nov. 1941, 12 pages.

Results of tests obtained in the use of 24 S-T as the specimen.

24d-5. Comparison of the Compressive Strength of Panels with Alclad 24 S-T 81 Sheet or With Alclad 24 S-T 86 Sheet Riveted to Alclad 24 S-T 84 Hat-Section Stiffeners. Robert A Weinberger, Carl A Rossman, and Gordon P. Fisher. *National Advisory Committee for Aeronautics, Wartime Report No.* L-587, April, 1944, 13 pages.

Tables and charts of data.

24d-6. Prediction and Reduction to Minimum Properties of Plate Compressive Curves. E. H. Schuette and J. C. McDonald. *Journal of the Aeronautical Sciences,* v. 15, Jan. 1948, p. 23-27, 48.

A method for predicting plate compressive curves or reducing them to minimum properties, based on similarities that exist between such curves and the stress-strain curve for the material. Comparison with experimental results for Mg and Al indicates that the method is satisfactory for extruded material.

24d-7. Buckling or Curved Sheet in Compression and Its Relation to the Secant Modulus. E. H. Schuette. *Journal of the Aeronautical Sciences,* v. 15, Jan. 1948, p. 18-22.

Compression tests were made on 87 curved magnesium alloy panels with aspect ratios near unity to determine the buckling stress. Panel radius-thickness ratios ranged from 86 to 515. A formula for the buckling stress for such panels.

24d-8. Engineering for Aluminum Alloy Castings. T. R. Gauthier and H. J. Rowe. *American Foundryman,* v. 13, Feb. 1948, p. 27-36.

The properties of the various aluminum alloys. Diagrams show suggested design details for simple structural elements. Recommended heat treating procedures, use of inserts of other metals to form wear-resisting surfaces, and the different casting processes, as well the effects of different mold materials. (Presented at A.S.M.E. Annual Meeting, Atlantic City, Dec. 3, 1947.)

24d-9. Stresses in and General Instability of Monocoque Cylinders With Cutouts. Part IV—Pure Bending Tests of Cylinders With Side Cutout. N. J. Hoff, Bruno A. Boley, and Louis R. Viggiano. *National Advisory Committee for Aeronautics, Technical Note* No. 1264, Feb. 1948, 91 pages.

Stress-distribution results are presented for pure bending tests of nine 24 S-T Alclad cylinders of 20-in. diameter, 30 to 90-in. length, and 0.012-in. wall thickness, reinforced with 24 S-T aluminum-alloy stringers and rings, and with cutouts on one side of the cylinders, situated symetrically with respect to its horizontal plane of symmetry.

24d-10. Structural Evaluation of an Extruded Magnesium Alloy T-Stiffened Panel. Norris F. Dow and William A. Hickman. *National Advisory Committee for Aeronautics, Technical Note* No. 1518, Feb. 1948, 19 pages.

Compressive tests were made of different lengths of a ZK 60 A magnesium-alloy flat panel having skin and longitudinal T-section stiffeners extruded as one integral unit. Results indicated that the extruded panel had structural characteristics which were somewhere between those for 24 S-T and those for 75 S-T Y-stiffened panels, but, because of the integral nature of the extruded construction, required far fewer rivets to assemble.

24d-11. The Strength of Thin-Web Beams With Transverse Load Applied at an Intermediate Upright. L. Ross Levin. *National Advisory Committee for Aeronautics, Technical Note No.* 1544, Feb. 1948, 20 pages.

Results of tests of several 24 S-T aluminum-alloy thin-web beams with transverse load applied at the end of an intermediate upright. A method of computing stresses and predicting failures in these directly loaded uprights. Comparison between experimental and calculated results.

24d-12. Dependence of the Stress-Strain Curves of Cold-Worked Metals Upon the Testing Direction. J. J. Klingler

and G. Sachs. *Journal of the Aeronautical Sciences,* v. 15, March 1948, p. 151-154.

Yield strength and stress-strain curve of cold worked aluminum-alloy plate were found to depend considerably upon the angle between the directions of the largest principal strains in cold working and testing, respectively. This directionality develops as a result of a small amount of cold work and then remains approximately constant, and is closely related to the Bauschinger effect.

24d-13. Stress and Distortion Measurements in a 45° Swept Box Beam Subjected to Bending and to Torsion. George Zender and Charles Libove. *National Advisory Committee for Aeronautics, Technical Note* No. 1525, March 1948, 36 pages.

Tip-bending and twisting loads were applied to an Al-alloy box beam with 45° sweep and stresses and distortions were measured. The bending tests revealed a considerable build-up of normal stress and vertical shear in the rear spar near the fuselage for the sweptback box beam. No such marked effect accompanied torsion.

24d-14. Compressive Strength of 24 S-T Aluminum-Alloy Flat Panels With Longitudinal Formed Hat-Section Stiffeners Having Four Ratios of Stiffener Thickness to Skin Thickness. William A. Hickman and Norris F. Dow. *National Advisory Committee for Aeronautics, Technical Note* No. 1553, March 1948, 41 pages.

Results for panels in which the thicknesses of the stiffener material are 0.39, 0.63, 1.00, and 1.25 times the skin thickness.

24d-15. Light Alloy Body-Building Progress. *Light Metals,* v. 11, March 1948, p. 135-137.

24d-16. Aluminum Piping; How to Use. C. B. McLaughlin. *Heating, Piping & Air Conditioning,* v. 20, April 1948, p. 78-82.

Lack of detailed specifications in the various codes; recommended allowable working pressures for process piping are given except where specifically covered in codes.

24d-17. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, May 1948, p. 142-145, 352-353.

Design of Al-alloy castings. Sixth of a series based on a survey sponsored by the Foundry Division of the Aluminum Association.

24d-18. Simplification of Light Metal Casting Design and Its Effect Upon Serviceability. W. T. Bean, Jr. *Transactions of the American Foundrymen's Association,* v. 55, 1947, p. 430-439; discussion, p. 440.

Application to numerous airplane parts. Use of direct strain measurement as a fundamental approach to the design problem using the brittle-lacquer technique.

24d-19. On Proof Stress in Compression. G. D. Chapman. *Light Metals,* v. 11, April 1948, p. 199-203.

Any variation of true proof stress in compression from that in tension for light alloys is probably caused by structural or mechanical heterogeneity.

24d-20. Tests of Cast Aluminum-Alloy Mixed-Flow Impellers. John E. Douglas and Irving R. Schwartz. *National Advisory Committee for Aeronautics, Wartime Report* No. E-277, April 1946, 15 pages.

Results showed that the cast impellers of one the alloys are suitable for use in superchargers up to tip speeds of at least 1200 ft. per sec.

24d-21. Biaxial Plastic Stress-Strain Relations for 24S-T Aluminum Alloy. Joseph Marin, J. H. Faupel, V. L. Dutton, and M. W. Brossman. *National Advisory Committee for Aeronautics Technical Note* No. 1536, May 1948, 96 pages.

Biaxial tensile stresses were produced in a tubular specimen by a specially designed testing machine which applies both an axial tensile load and an internal pressure to a tubular specimen, thereby producing biaxial tensile stresses in the tube wall. Strains were measured in the plastic range up to rupture by means of special electric SR-4 clip gages. Stress-strain data were obtained from flat control specimens cut from the tubular specimens and compared with tension-test data obtained from tubular specimens. Except for ductility values, the results show good agreement.

24d-22. A Check List for the Designer in Magnesium. *Magazine of Magnesium,* May 1948, p. 8-11.

Properties.

24d-23. Engineering for Aluminum-Alloy Castings. T. R. Gauthier and H. J. Rowe. *Mechanical Engineering,* v. 70, June 1948, p. 505-514.

Previously abstracted from *American Foundryman,* v. 13, Feb. 1948, p. 27-36. See item 24d-8, 1948.

24d-24. Light Alloys Need New Design Concepts. J. A. Gregoire. *Product Engineering,* v. 19, July 1948, p. 81-85.

Is the simple substitution of a light alloy for steel a good design practice? The author holds that sub-

stitution produces only an approximation of the possibilities. He calls for a complete break with traditional design when using light alloys. Examples of European practice in automotive design.

24d-25. Design of Aluminum Truck Bodies. *Modern Metals,* v. 4, July 1948, p. 15-19.

Design and fabrication.

24d-26. Stress Notch Sensitivity With Eccentric Holes. L. Schapiro and R. H. Esling. *Transactions of the American Society of Mechanical Engineers,* v. 70, Feb. 1948, p. 135-138.

The tension strengths of some cross sections containing holes of several diameters in various positions of eccentricity were determined for aluminum alloys 24 S-T, 75 S-T, and 14 S-T. A mathematical expression is suggested for the relationship between strength, hole size, and eccentricity of hole. The relative stress notch-sensitivity of the three alloys was found to be the same with eccentric holes as for central holes or external notches.

24d-27. Fracture Strength of 75 S-T Aluminum Alloy Under Combined Stress. E. G. Thomsen, I. Lotze, and J. E. Dorn. *National Advisory Committee for Aeronautics, Technical Note* No. 1551, July 1948, 30 pages.

The effect of combined and other stresses on the fracture strength of 75 S-T aluminum alloy is determined by applying axial loads and internal pressure to thin-wall drawn tubes. Tubular extrusions of 75 S-T aluminum alloy rupture in substantial agreement with the critical shear-stress law for fracture. 13 ref.

24d-28. Flexural Strength and Stiffness of Wood-Aluminum Sandwich Panels. Roy A. Miller and Henry L. Langhaar. *Product Engineering,* v. 19, Aug. 1948, p. 104-108.

Investigation and appraisal of the structural properties and efficiency of sandwich panels and columns having aluminum skins and cores of different woods.

24d-29. Axial Fatigue Tests at Zero Mean Stress of 24 S-T and 75 S-T Aluminum-Alloy Strips With a Central Circular Hole. W. C. Brueggeman and M. Mayer, Jr. *National Advisory Committee for Aeronautics, Technical Note* No. 1611, Aug., 1948, 23 pages.

Tests were made on 0.032 and 0.064-in. 24 S-T and 0.032-in. 75 S-T sheet-metal specimens ¼, ½, 1, and 2 in. wide without a hole and with central holes giving a range of hole diameter to specimen width from 0.01 to 0.95. Evidence was found that a very small hole would not cause any reduction in fatigue strength.

24d-30. How to Design Pressure Moldings. James L. Erickson. *Machine Design,* v. 20, Sept. 1948, p. 118-122, 184, 186.

Combining the desirable characteristics of Al-alloy die castings and heat treated permanent moldings, pressure moldings manifest superior mechanical properties in the as-cast condition and can be heated to elevated temperatures without blistering or distorting. How to design parts to be made by pressure molding from the viewpoint of mechanical properties.

24d-31. Hyperbolic Column Formulas for Magnesium-Alloy Extrusions. E. H. Schuette. *Journal of the Aeronautical Sciences,* v. 15, Sept. 1948, p. 523-529.

Results for tests of 89 Z-section columns of M, FS-1, J-1, O-1, and O-1HTA alloys conducted in an effort to obtain suitable formulas for use in design.

24d-32. Allroom Furniture Construction. Wolfgang Offik. *Modern Metals,* v. 4, Sept. 1948, p. 22-24.

Aluminum furniture and cabinets designed by an Austrian architect (Prof. Sauer). These unusual pieces are all constructed from individual elements of a limited number of standard shapes and sizes which can be assembled into any piece of furniture or cabinet desired by means of a simple peg system, without need for services of a skilled craftsman.

24d-33. The Inward Bulge Type Buckling of Monocoque Cylinders. IV. Experimental Investigation of Cylinders Subjected to Pure Bending. N. J. Hoff, Bruno A. Boley, and S. V. Nardo. *National Advisory Committee for Aeronautics, Technical Note* No. 1499, Sept. 1948, 73 pages.

Eighteen 24 S-T Alclad aluminum-alloy cylinders of 20-in. diameter, with skin thicknesses of 0.012 to 0.025 in. and lengths of 40.5 to 64 in., were tested. They were reinforced with either 16 or 28 stringers and either 5 or 6 rings.

24d-34. Aluminum Sheet-Stringer Panels for Airplane Construction. *Modern Metals,* v. 4, Sept. 1948, p. 24-26.

Practical results of recent work by the N.A.C.A. and Bureau of Standards, on the buckling of the above panels under various conditions.

24d-35. Column and Plate Compressive Strength of Extruded XB 75 S-T Aluminum Alloy. George J. Heimerl and

J. Albert Roy. *National Advisory Committee for Aeronautics,* Restricted Bulletin No. L 4E26, May 1944, 3 pages (Declassified.)

Results of tests to determine the column and plate compressive strength of extruded XB 75 S-T aluminum alloy, and comparative values for 24 S-T sheet. Stress-strain curves, too.

24d-36. Direct-Reading Design Charts for 75 S-T Aluminum-Alloy Flat Compression Panels Having Longitudinal Straight-Web Y-Section Stiffeners. Norris F. Dow and William A. Hickman. *National Advisory Committee for Aeronautics, Technical Note* No. 1640, Aug. 1948, 38 pages.

24d-37. Aluminum as a Structural Material. Part II. Paul Weidlinger. *Progressive Architecture,* v. 29, Oct. 1948, p. 89-92.

Design principles for aluminum structures and typical examples.

24d-38. Effective Extrusion Design in Aluminum. Harold Cohen. *Light Metal Age,* v. 6, Oct. 1948, p. 8-12, 29.

With aluminum, in contrast to the limited number of standard rolled sections available in steel, one can determine the exact section required and have it extruded, since the die cost for special shapes is relatively small. Principles of design.

24d-39. Plate Compressive Strength of FS-1h Magnesium-Alloy Sheet and a Maximum-Strength Formula for Magnesium-Alloy and Aluminum-Alloy Formed Sections. George L. Gallaher. *National Advisory Committee for Aeronautics, Technical Note No.* 1714, Oct. 1948, 23 pages.

Determined from local-instability tests of formed Z-section columns. The critical compressive stress was found to correlate well with the compressive stress-strain curve for the material. An empirical formula was developed for calculating the average stress at maximum load for formed Z-sections and channel sections.

24d-40. Determination of Dynamic Loads in Coach Structures. W. E. Rice and R. O. Ellerby. *SAE Quarterly Transactions,* v. 2, Oct. 1948, p. 571-577, 626.

Use of strain gages, especially the SR-4 resistance-wire type. The electronic instruments that must be used in conjunction with this gage and the practical application of such equipment. Construction of the bus bodies referred to is almost entirely riveted aluminum.

24d-41. Aluminum Cylinders—Increase Power, Decrease Weight. A. W. Mall. *Machine Design,* v. 20, Nov. 1948, p. 136-138.

All-aluminum one-cylinder engine used to drive a variety of portable tools. The bores of the die-cast Al cylinders are chromium plated for better heat transfer, wear resistance, and performance.

24d-42. Light Alloy Pistons and Bearings. *Light Metals,* v. 11, Oct. 1948, p. 568-573; Nov. 1948, p. 598-603. Based on article by Mahle in *Bergund Huttenmännischen Monatshefte,* Sept. 1948.

Technical and economic considerations, the latter mainly from the Austrian point of view.

24d-43. The Stress-Strain Characteristics of a Magnesium Alloy Beam. A. E. Johnson and D. C. Herbert. *Aircraft Engineering,* v. 20, Nov. 1948, p. 330-334.

Behavior when electrically and plastically deformed by a uniform bending moment at room temperature. Apparatus is described.

SECTION XXV

STATISTICS

25a—General

25a-1. The Atom and Industry. David E. Lilienthal. *Iron Age,* v. 161, Jan. 1, 1948, p. 126-129.

What does atomic energy mean to the average business? Will it create new markets? Will it render obsolete present industrial equipment? How far away is the harnessing of nuclear energy for industrial purposes? Plans of the Commission for the development of nuclear energy over the next five years.

25a-2. The New Giant of the West. R. T. Reinhardt. *Iron Age,* v. 161, Jan. 1, 1948, p. 190-197.

Problems caused by the large recent expansion of primary aluminum plants, whose high power demands threaten to restrict expansion of industry in other directions.

25a-3. Prices and Production. H. W. Van Camp. *Iron Age,* v. 161, Jan 1, 1948, p. 236-238, 274, 278, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308.

Statistical section gives data for many years back, often for each month of the year. The period covered varies with the product.

25a-4. Prospects for 1948. W. J. Campbell. *Steel,* v. 122, Jan. 5, 1948, p. 118-123.

Economic prospects for the metal-working industries.

25a-5. Distribution. B. K. Price. *Steel,* v. 122, Jan. 5, 1948, p. 134-137.

Problem of development of a more efficient system for channeling steel and finished products as well as other materials from producer to consumer.

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25a-10. Construction. L. E. Browne. *Steel,* v. 122, Jan. 5, 1948, p. 152-153.

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25a-21. Metal Mining in the Eastern States in 1947. *Skillings Mining Review,* v. 36, Jan. 31, 1948, p. 6, 10-11.
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25a-37. Metallurgical Books. (Continued.) Sibyl E. Warren. *Metals Review,* v. 21, April 1948, p. 41, 43.
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25a-42. The Unit Processes of Chemical Metallurgy. R. Schuhmann, Jr. *Metals Technology,* v. 15, June 1948, T.P. 2363, 6 pages.
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25a-51. Onward Motives in Research. Edward R. Weidlein. *Chemical and Engineering News,* v. 26, Sept. 20, 1948, p. 2764-2769, 2857.
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25a-52. Industrial Minerals in the National Economy. M. F. Goudge. *Canadian Mining and Metallurgical Bulletin,* v. 41. *(Transactions,* v. 51), Sept. 1948, p. 525-531.

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Possibilities of expanding output and exports to U. S. through Marshall Plan funds.

25a-54. Mineral Position of ECA Nations. No. 1. Germany. No. 2 Austria. John C. Christie. **No. 3. Italy.** Diego Straniero. *Engineering and Mining Journal,* v. 149, Oct. 1948, p. 70-79.

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25a-55. Impact of ECA on Mining Industry. Evan Just. *Metals,* v. 19, Oct. 1948, p. 11-12.

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25b—Ferrous

25b-1. Arctic Iron Mines. Frank Illingworth. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 556.

Swedish plans for expansion of output.

25b-2. Rhodesian Steel Scheme. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 553-556.

New development will make a large contribution to solution of the world supply problem. Proximity of high-grade hematite, coal deposits, and hydro-electric potentialities make the prospects attractive for Britain.

25b-3. Brazilian Ore Resources and the Volta Redonda Plant. Part II. Ralph Vaill. *Blast Furnace and Steel Plant,* v. 35, Dec. 1947, p. 1488-1489, 1538.

Advantages of plant because of the superior quality of available raw materials. A rosy future is ahead for Brazilian steelmaking and ore export from this area, although at present more than 130,000 tons of steel are unsold and apparently unwanted.

25b-4. Geneva Steel. Walther Mathesius. *Western Metals,* v. 5, Dec. 1947, p. 25-27.

Present status and future prospects; lists of potential consumers.

25b-5. Steel at the Crossroads. Tom Campbell. *Iron Age,* v. 161, Jan. 1, 1948, p. 130-139.

Economic prospects, gray markets, demand, prices, competition. Results of a survey of 1850 large steel consumers concerning their relations with the various steel companies.

25b-6. Two Worlds and Steel. Jack Hight. *Iron Age,* v. 161, Jan. 1, 1948, p. 140-147.

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25b-7. The Steel Consumer; Rx—Aspirins, Ingenuity and Hope. D. I. Brown. *Iron Age,* v. 161, Jan. 1, 1948, p. 148-155.
Future prospects for steel supply and prices.

25b-8. Raw Materials Still a No. 1 Problem. W. A. Lloyd. *Iron Age,* v. 161, Jan. 1, 1948, p. 210-219.
The many facets of the iron ore picture: open-pit reserves, taconite concentration, development of deposits in Labrador and Brazil, the St. Lawrence waterway.

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Advantages of the multiple basing point system of steel pricing and marketing and future prospects for changes in it. Chart gives basing points of major steel products.

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1948 prospects for additions to capacity; ore, coke, and scrap supplies; demand for various types of products; exports; wages; prices.

25b-11. Europe Drives for Recovery. Vincent Delport. *Steel,* v. 122, Jan. 5, 1948, p. 322-323.
Economic situation, especially in iron and steel.

25b-12. British Making Progress. J. A. Horton. *Steel,* v. 122, Jan. 5, 1948, p. 323-324.
Economic situation, especially in iron and steel.

25b-13. France—Belgium. Leon Jaudoin and Jacques Foulon. *Steel,* v. 122, Jan. 5, 1948, p. 324-325.
Economic situation, especially in iron and steel.

25b-14. Italy. Antonio Giordano. *Steel,* v. 122, Jan. 5, 1948, p. 325.
Economic situation, especially in iron and steel.

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Depletion of high-grade ores in the Mesaba. Prospects for beneficiation and for obtaining of high-grade ore from Laborador are promising.

25b-16. Iron Ore in 1947. *Skillings Mining Review,* v. 36, Jan. 24, 1948, p. 1, 4.
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25b-17. Scrap Supply to Continue Tight. *Steel,* v. 122, Jan. 26, 1948, p. 26-27, 119.
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25b-18. Iron Ore. Norwood B. Melcher. *1946 Bureau of Mines Minerals Yearbook Preprint,* 26 pages.
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25b-19. Iron and Steel Scrap. Norwood B. Melcher and James E. Larkin. *1946 Bureau of Mines Minerals Yearbook Preprint,* 23 pages.
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25b-20. Steel Expansion in Overseas Countries Still in Talking Stage. *Iron Age,* v. 161, Jan. 29, 1948, p. 111-112.
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25b-21. The Modern Coke Plant. T. J. Ess. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. C3-C37.
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25b-23. 1947 Iron Ore Review. M. D. Harbaugh. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 49-53, 113.
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25b-24. Supply of Scrap in 1948 to be Equal to, or Greater Than, Supply in 1947. Edward C. Barringer. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 89-90.
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25b-26. Grades of L. S. Iron Ore Shipped by Lake in 1947. *Skillings Mining Review,* v. 36, Feb. 7, 1948, p. 1-2.
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25b-28. Eastern Magnetite. J. R. Linney. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 93-94.
Production data.

25b-29. Ferro-Alloy Metals. R. G. Knickerbocker. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 109-110.

1947 developments, both economic and technical.

25b-30. Steel "Extras"—Why They Exist and How to Save on Them. Harold A. Knight. *Materials & Methods,* v. 27, Feb. 1948, p. 61-65.

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25b-31. Polish Iron and Steel Industry Progress. *Metal Bulletin,* Feb. 3, 1948, p. 7.

25b-32. Spectre of Iron Ore Shortage Dims Dreams of More Pig Iron. Bill Lloyd. *Iron Age,* v. 161, Feb. 19, 1948, p. 113-114.

The rush to expand blast furnace production and get early spring shipments.

25b-33. The Sheet and Strip Shortage. *Steel,* v. 122, Feb. 23, 1948, p. 55-62.

Results of a survey. Many tables and graphic charts, and a list of U. S. producers of sheet and strip, including capacity tonnages for each of six types of product.

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25b-35. The Gray Iron Castings Industry. Raymond L. Collier. *Foundry,* v. 76, March 1948, p. 94-95, 206, 208, 210, 212, 214.

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25b-38. Iron Ore. M. D. Harbaugh. *Mining Congress Journal,* v. 34, Feb. 1948, p. 74-78.

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25b-39. Ferro-Alloys in 1947. Edwin K. Jenckes. *Mining Congress Journal,* v. 34, Feb. 1948, p. 115-118.

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25b-40. Polish Iron and Steel. F. Wirth. *Iron and Steel,* v. 21, Feb. 1948, p. 44.

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25b-41. European Economy; Outlook for Iron and Steel Production. *Iron and Steel,* v. 21, Feb. 1948, p. 52-54, 64.

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25b-42. The Reconstruction Program; Some Technical Aspects. T. P. Colcough. *Iron and Steel,* v. 21, Feb. 1948, p. 57-62. Second Triennial Harold Wright Lecture.

An extensive discussion of the British program for modernization of their iron and steel industry. (Presented to Cleveland Scientific Institute, Great Britain, Nov. 12, 1947.)

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Statistical data.

25b-44. Statistics of the Iron and Steel Industry of the United Kingdom (For the Years 1939-1944). British Iron and Steel Federation, Sept. 1945, 57 pages.

25b-45. Economics of Britain's Steel Industry, Robert Shone. *Iron and Steel Engineer,* v. 25, March 1948, p. 66-68.

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25b-48. Industry's Steel Needs. *World Oil,* v. 127, April 1948, p. 57-58, 60.

Survey of the steel requirements of the entire American petroleum industry and its related activities, both domestic and foreign, prepared by oil-industry men serving on the committee on petroleum-industry steel requirements, of the National Petroleum Council.

25b-49. U. S. Steel; Into Chemicals? *Business Week,* April 10, 1948, p. 30, 32.
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25b-50. 1947 L. S. Iron Ore Shipments by Companies. *Skillings Mining Review,* v. 37, April 17, 1948, p. 1, 4.

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25b-52. Survey of Steel Manufacturers; Production Costs Per Net Ton of Selected Carbon Steel Products, Nine Months Ending September 30, 1944. *Office of Temporary Controls* (Washington), *OPA Economic Data Series No.* 17, May 1947, 3 pages.

25b-53. Economics of Application of High Strength Steel in Freight Cars. A. F. Stuebing. *American Society of Mechanical Engineers, Paper* No. 47-A-107 (Advance Copy.), 1947, 14 pages.
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25b-54. Should the Steel Industry Expand Now? T. C. Du Mond. *Materials & Methods,* v. 27, April 1948, p. 65-67.
Problems and economic aspects.

25b-55. Texas Steel Industry—Markets. D. I. Brown. *Iron Age,* v. 161, April 29, 1948, p. 119-120, 122.
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25b-59. The Stamper Looks at His Steel Needs. *Steel Processing,* v. 34, May 1948, p. 239-241.
Surveys prospective needs for sheet and strip steel for various uses.

25b-60. Average Analyses of 1947 Shipments of Lake Superior Iron Ore. *Skillings Mining Review,* v. 37, May 8, 1948, p. 1, 4, 9.

25b-61. Should the Federal Government Subsidize New Steel Capacity in the West? *Modern Industry,* v. 15, May 15, 1948, p. 100-102, 105-106, 108.
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25b-62. Position of Steel in 1948. W. S. Tower. *Mining and Metallurgy,* v. 29, May 1948, p. 274-277.
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25b-63. Mexico's Steel Industry. Carroll E. Plumb. *Electrical Engineering,* v. 67, June 1948, p. 533-534. Essentially full text of A.I.E.E. paper 48-153, "Steel Industry in Mexico."
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25b-64. An Investigation of the Feasibility of a Steel Plant in the Lower Columbia River Area Near Portland, Oregon. Raymond M. Miller. *Department of Geology and Mineral Industries, State of Oregon,* (Portland), *Bulletin* No. 8, 1940, 55 pages.
Production, consumption, and costs.

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25b-67. The Hematite of Labrador and New Quebec. W. M. Bonham. *Canadian Mining Journal,* v. 69, June 1948, p. 67-70.

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25b-69. French Alloy and Tool Steel Industry. *Iron Age,* v. 162, July 1, 1948, p. 80-81.

Map and list of companies; exact locations of the major producers and the types of steel each specializes in.

25b-70. Market Trends and New Developments in Steel. D. H. Malcom. *Stove Builder,* v. 13, July 1948, p. 53-54, 58, 60, 62, 64.

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The how and where of conversion arrangements and some of the complex technical problems involved. Only the practical details of conversion from ingots or slabs to sheet or strip are presented.

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New York State iron ore mines, among the oldest in the country, are now being looked to as a raw material reserve for the steel industry. These ores are reported to lend themselves to concentration and sintering to produce excellent open-hearth charge ore and blast-furnace sinter.

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Available supply compared with our war peak. Further expansion.

25b-80. Western Steel Sources. *Western Metals,* v. 6, Sept. 1948, p. 23.

Sources of various semi-finished and finished forms.

25b-81. Volta Redonda Begins to Pay Off After Two Years of Operation. Steve Smoke. *Iron Age,* v. 162, Sept. 23, 1948, p. 133.

Brazilian mill is important factor in reduction of that country's imports.

25b-82. A Guide to the Steel Industry's New Pricing System. *Steel,* v. 123, Sept. 27, 1948, p. 47-62.

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25b-84. Modern Tata Steel Works Make Dream of Indian Industrialist Real. Steve Smoke. *Iron Age,* v. 162, Sept. 30, 1948, p. 97-98.

Expansion currently planned seen making India self-sufficient on steel.

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Presents data by states.

25b-90. Basic Metal Plants Expanding in South. Sidney Fish. *Manufacturers Record,* v. 117, Nov. 1948, p. 60, 63.

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25b-91. A New French Iron and Steel Research Centre. *British Steelmaker,* v. 14, Nov. 1948, p. 500-502.

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25b-92. Labrador Iron. Herbert Yahraes. *Scientific American,* v. 179, Nov. 1948, p. 9-13.

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25b-96. Pig Iron—The Future Outlook. John A. Claussen. *Stove Builder,* v. 13, Dec. 1948, p. 74, 76, 78, 134, 136, 138.

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25c-6. The Mineral Industry of Alaska. Alfred L. Ransome. *1946 Bureau of Mines Minerals Yearbook Preprint,* 12 pages.
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Some information on nonferrous metals production.

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25c-64. Holds Domestic Allocation and Distribution Controls Over Tin and Antimony Still Needed. Charles Sawyer. *Metals,* v. 19, Sept. 1948, p. 8-10, 12.

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25d—Light Metals

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25d-2. Magnesium. C. E. Nighman and Mary E. Trought. *1946 Bureau of Mines Minerals Yearbook Preprint,* 12 pages.

U. S. and foreign statistics. Also reviews technical developments. 16 ref.

25d-3. Bauxite. Hubert W. Davis and Mary E. Trought. *1946 Bureau of Mines Minerals Yearbook Preprint,* 13 pages.

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25d-4. Soviet Russia's Aluminum Totals. *Chemical Age,* v. 58, Jan. 17, 1948, p. 98. Based on article in *Revue d'Aluminium.*

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25d-5. 1947 Aluminum Record. Roy A. Hunt. *Western Metals,* v. 6, Jan. 1948, p. 29.

Production, supplies, and future prospects.

25d-6. The Economic Status of Magnesium. J. D. Hanawalt. *Modern Metals,* v. 3, Jan. 1948, p. 24-28.

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25d-9. Panorama Della Produzione Della Bauxite nei Paesi Europei. (Survey of Production of Bauxite in European Countries.) F. Magri. *Alluminio,* v. 16, Nov.-Dec. 1947, p. 508-516.

Production from 1900 to date in Italy, Germany, France, Great Britain, Ireland, Jugoslavia, Hungary, Roumania, Greece, Bulgaria, Spain, Sweden, and Russia.

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25d-13. The Indian Aluminum. S. K. Ghaswala. *Light Metal Age,* v. 7, June 1948, p. 16-18.

A statistical review of production at the Aluminium Corp. of India, Ltd.

25d-14. Caribbean Aluminum Ores. O. C. Schmedeman. *Engineering and Mining Journal,* v. 149, June 1948, p. 78-82.

Immense deposits of a new type of high-quality aluminum ore have been discovered and proved during the past five years in the islands of Jamaica and Hispaniola.

25d-15. The Aluminum Industry. How to Increase the Supply. W. B. Griffin. *Modern Metals,* v. 4, June 1948, p. 13-20.

World aluminum situation and suggestions for increasing the domestic supply.

25d-16. Panorama della bauxite in Italia. (Outline of Bauxite Situation in Italy). F. Magri. *Alluminio,* v. 27, March-April 1948, p. 143-149.

An approximate estimation of bauxite ore reserves, particularly of central Italy. Data concerning consumption during 1909-1947. Leucite reserves.

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Role of aluminum production and fabrication, at the recent international trade fair held in Budapest. Comments regarding the present technical state of light-metal industries in Hungary.

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Discovery of what may be the world's largest deposit of titanium ore and plans to develop it.

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25d-20. The Indian Aluminium Industry. S. K. Gaswala. *Light Metals,* v. 11, Sept. 1948, p. 510-511.

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25d-21. Outlook for Magnesium in Canada. J. D. Barrington. *Modern Metals,* v. 4, Oct. 1948, p. 18-20.

Mining background, production, Canadian fabricators, availability, and product development.

25d-22. Rearmament Program Exerting Little Demand for Magnesium. John Anthony. *Iron Age,* v. 162, Nov. 4, 1948, p. 165-166.

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25d-23. Aluminum; Its First Sixty Years. *Modern Metals,* v. 4, Nov. 1948, p. 17-19.

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History of aluminum and future prospects.

25d-25. From Present Bottleneck to Greater Production. Roy A. Hunt. *Modern Metals,* v. 4, Nov. 1948, p. 22-23.

Present status and future prospects for aluminum.

25d-26. Aluminum & Competitive Materials. Zay Jeffries. *Modern Metals,* v. 4, Nov. 1948, p. 24.

A brief discussion.

25d-27. Aluminum Prices; The Industry's Record. Irving Lipkowitz. *Modern Metals,* v. 4, Nov. 1948, p. 35-36.

25d-28. The Aluminum Shortage. How Long Will it Last? Samuel Moment. *Modern Metals,* v. 4, Nov. 1948, p. 39-40.

The effect of the current power shortage on aluminum production and how to relieve it.

25d-29. Aluminum Ingot Outlook for Foundries and Die Casters. *Modern Metals,* v. 4, Nov. 1948, p. 43-44.

Present price and supply situation, the reasons behind it; future prospects.

25d-30. Nations Getting ECA Aluminum Exporting to U. S. at Premiums. John Anthony. *Iron Age,* v. 162, Nov. 25, 1948, p. 137-138.

Big tonnages and sales at markups of 50 to 70% over domestic prices are said to be involved.

25d-31. Secondary Aluminum Outlook for 1949. Carl H. Burton. *Metals,* v. 19, Nov. 1948, p. 11-13.

Discussed by Secretary, Aluminum Research Institute. (To be continued.)

SECTION XXVI

MISCELLANEOUS

26a—General

26a-1. **The Place of the Metallurgist in Industry.** Arthur Smout. *Metallurgia,* v. 37, Nov. 1947, p. 7-10.

Condensed from an address delivered Nov. 19, 1947, to a combined meeting of technical societies.

26a-2. **Metallurgy and Atomic Energy.** C. Hubert Plant. *Metallurgia,* v. 37, Nov. 1947, p. 15-19.

Basic principles of atomic structure. (To be continued.)

26a-3. **Facilities and Activities in Metallurgical Research.** Mars G. Fontana. *Engineering Experiment Station News* (Ohio State University), v. 19, Dec. 1947, p. 3-4.

Facilities at Ohio State.

26a-4. **Institute for the Study of Metals, the University of Chicago.** Cyril Stanley Smith. *Scientific Monthly,* v. 65, Dec. 1947, p. 489-492.

The new institute is to be devoted to fundamental rather than applied metallurgical research.

26a-5. **Metallurgy Research Drives to Meet New Economic Needs.** E. S. Kopecki. *Iron Age,* v. 161, Jan. 1, 1948, p. 198-207.

Important developments of 1947 and important research now in progress.

26a-6. **Washington.** Eugene J. Hardy. *Iron Age,* v. 161, Jan. 1, 1948, p. 244, 246.

New metallurgical research programs now planned by the military.

26a-7. **Metallurgy.** *Steel,* v. 122, Jan. 5, 1948, p. 190-193.

Brief reviews of new developments: Graphitization Resistance Aided by Alloys in C-Mo Steels, by J. W. Bolton; Substructural Imperfections Identified With Fractography, by Carl A. Zapffe; Electrodeposited Alloys Improve Bearing Material Properties, by L. A. Barera; Beryllium Copper Useful in Heavy Gage Applications, by H. G. Williams; Forecasts Powder Metallurgy Improvement in Coming Year, by A. J. Langhammer; Isothermal Quenching Broadens Scope of Heat Treatment, by Orlo E. Brown; New Rolling Capacity for Superalloys Imminent, by C. G. Chisholm; Use of Recent Developments Helps Meet Stiff Competition, by J. A. Scully; Materials Substitutions to Continue During 1948, by J. T. Jarman; 1947 Viewed as Theory Year Offering Future Potentialities, by R. H. Harrington; Notch Sensitivity of Plate Steel Actively Studied, by Samuel Epstein; Less Attention to Composition, More to Hardenability of Steels, by Howard E. Boyer; Metallurgist Can Offer Aid to the Design Engineer, by Arnold P. Seasholtz; Higher Speeds Demand Better Bearing Qualities, by Joseph J. Mayer; Sees Increase in Basic Metallurgical Knowledge, by A. S. Jameson; Rolled Isotopes for Shielding Sources of Nuclear Energy, by Arthur E. Focke.

26a-8. **Lubrication.** *Steel,* v. 122, Jan. 5, 1948, p. 243-244, 246.

Brief reports on recent developments: Mounting of Roller Bearings Aided by Oil Injection Method, by A. Stewart Murray; Prelubricated Sealed Bearings Run Nine Years Without Regreasing, by D. E. Batesole; Trend Toward Use of Water Soluble Coolants Is Noted, by A. E. Carpenter; Open Gear Lubrication Presents Difficult Problems, by Joseph A. Rigby; Uniform Lubricating Systems Best Management Investment, by E. J. Ehret; Suggests Key to Modern Industrial Lubrication, by James G. O'Neill, Jr.; Stresses Importance of Oil Purification Equipment, by B. F. Hunter; Improved Quenching Oil Offers Maximum Hardness, Less Distortion, by E. L. H. Bastian; Use of Nonsoap Greases Increasing in Metalworking, by Clifford C. Goehring.

26a-9. **High-Temperature Greases.** H. A. McConville. *Product Engineering,* v. 19, Jan. 1948, p. 93-95.

Factors which should be considered in selection and application.

26a-10. **The Passage of Liquid Conductors Through Minute Orifices in Di-**

electrics. M. V. Griffith and A. Morris
Series, v. 38, Feb. 1947, p. 81-96.
Thomas. *Philosophical Magazine,* 7th

Mercury will pass through a small hole or puncture produced electrically or mechanically in a dielectric partition separating the mercury from a semi-conducting liquid medium under the action of an applied voltage. A theory for this phenomenon. A similar action occurs with conducting liquids (for instance, water) if they are immiscible with the medium. It is believed that any liquid would act similarly and that metals, for example, might be obtained in the form of a colloidal dispersion by use of a quartz capillary tube at temperatures higher than the fusing point of the metal if a suitable liquid medium were available.

26a-11. Electrical and Allied Developments During 1947. Guy Bartlett. *General Electric Review,* v. 51, Jan. 1948, p. 11-53.

Covers a wide variety of fields including atomic power; supersonic flight; germanium; ceramics; welding; testing and measuring instruments; electronics; power generation, transmission, and distribution; motors; industrial heating; mining; iron and steel; lumber and paper; printing; textiles; rubber; plastics; food industries; lighting; air conditioning; home appliances; metallurgy; transportation; and others.

26a-12. Who Sells It. The Iron Age Metalworking Buyers' Guide. A. D. Stout, Jr., and T. S. Blair. *Iron Age,* v. 161, Jan. 1, 1948, p. 208-209, 310, 312-328; Jan. 8, 1948, p. 106, 108, 110; Jan. 15, 1948, p. 87-88, 129-130.

Directory lists companies and addresses under products, which are listed alphabetically. (To be continued.)

26a-13. What to Look for in Hydraulic Oils. Part V. Oxidation Stability. Part VI. Lubricating Value. Anthony J. Zino, Jr. *American Machinist,* v. 92, Jan. 1, 1948, p. 96-99; Jan. 15, 1948, p. 97-100.

Part V points out that excessive heat or presence of contaminants will change an oil's properties and give rise to erratic operation or damage to hydraulic mechanisms. Part VI points out the necessity for oiliness or lubricating value, although the primary purpose of the fluid is to transmit motion. Effects of poor lubricant properties on metal parts of hydraulic systems; test machines for evaluating the oils. (To be continued.)

26a-14. Annual Engineering Review. *Materials & Methods,* v. 27, Jan. 1948, p. 87-106.

Divided into the following sections: Trends in materials and their processing; irons and steels; nonferrous metals; plastics; other nonmetallic materials; fabricated materials and precision parts; finishes and coatings.

26a-15. Tracers in Metallurgy. Julius J. Harwood. *Nucleonics,* v. 2, Jan. 1948, p. 57-61.

Use of radioactive tracer techniques as applied to metallurgical problems by two university laboratories. The major study was that of diffusion processes in the solid and liquid states.

26a-16. Ultrasonics: Magic Wand in Production. *Modern Industry,* v. 15, Jan. 15, 1948, p. 50-53.

Review of varied industrial uses.

26a-17. The Design of Radiochemical Laboratories. Henri A. Levy. *Atomic Energy Commission,* MDDC-262, Aug. 20, 1946, 15 pages.

Facilities, equipment, and precautions necessary for work at three levels of radioactivity. A chart shows the approximate range of radioactivity encountered in various research problems. Study of the information presented should lead to more widespread application of radioisotopes.

26a-18. Metallurgy in America, 1917-1947. *Metal Progress,* v. 53, Jan. 1948, p. 75-78.

Important metallurgical events during the past 30 years, listed chronologically.

26a-19. The Study of Diamonds for Industrial Use. H. D. H. Drane. *Research,* v. 1, Jan. 1948, p. 150-158.

Fundamental information and its application to industrial uses, especially in abrasive finishing.

26a-20. Economic Considerations in Industrial Ultrasonics. S. Young White. *Audio Engineering,* v. 32, Jan. 1948, p. 31-32, 47.

Factors of importance in application of ultrasonics to commercial processes.

26a-21. Engineering Developments in 1947. Harold Schor, editor. *Product Engineering,* v. 19, Feb. 1948, p. 81-86.

New applications and improvements of high-temperature materials; use of rare metals; aviation turbines, jets, and rockets; railway shock absorbers; motors; testing and measuring; production techniques; and nucleonics.

26a-22. Materials Experts Explore Greater Economy. *SAE Journal,* v. 56, Feb. 1948, p. 76-77.

Reviews five papers and accompanying discussion, devoted to automotive materials, presented at S.A.E. annual meeting, Detroit, Jan. 12-16, 1948.

26a-23. Metallurgy and Atomic Energy. C. Hubert Plant. *Metallurgia,* v. 37, Jan. 1948, p. 137-140.

In second of series, attention is directed to a consideration of the nucleus of the atom (To be continued.)

26a-24. Trends in Metallurgical Research. Cyril Stanley Smith. *Yearbook of the American Iron and Steel Institute,* 1947, p. 529-537.

Discusses need for greater emphasis on fundamental research in metallurgy. (Presented at A.I.S.I. Meeting, New York, May 21-22, 1947.)

26a-25. Research for Ceramic Industries. Battelle Memorial Institute, Columbus, Ohio. 15 pages.

A profusely illustrated brochure which describes the organization and administration of research at Battelle and the facilities for research in ceramic products, including abrasives, cements, vitreous enamels, glass, pottery, heavy clay products, refractories, terra cotta, and whitewares.

26a-26. The Interrelation of Engineering and Metallurgy. Arthur P. M. Fleming. *Engineering,* v. 165, Jan. 30, 1948, p. 116.

Part which metallurgy played in development of steam and gas turbines, jet engines, and production of atomic energy, pointing out interrelationships of the various branches of science and technology. (Condensed from lecture presented to Institute of British Foundrymen, London, Jan. 16, 1948.)

26a-27. Problems Encountered by the R.E.M.E. in the Field. E. Bertram Rowcroft. *Engineering,* v. 165, Jan. 30, 1948, p. 117-120. Condensed from the fourth James Clayton Lecture.

An extended description of some of the problems in connection with ordnance equipment encountered by the Corps of Royal Electrical and Mechanical Engineers during World War II. Metallurgical and other problems in connection with gun barrels, recoil springs, and carriages, tanks; landing craft, amphibious vehicles; artillery director systems; and other military equipment. (Presented to Institution of Mechanical Engineers, London, Dec. 19, 1947.)

26a-28. War Department's Research and Development Program. E. A. Routheau. *Metal Progress,* v. 53, Feb. 1948, p. 249-250.

A number of important unsolved metallurgical problems of both practical and fundamental types in which the U. S. Army is interested.

26a-29. Oxygen in Steelmaking, Minerals Share Convention Spotlight. *Iron Age,* v. 161, Feb. 26, 1948, p. 127-130.

Reviews proceedings of 1948 annual A.I.M.E. meeting, New York.

26a-30. Time: Advancement Through the Years. George G. Ensign. *Scientific Monthly,* v. 46, March 1948, p. 206-212.

Development of present-day watches, including development of an improved lubricant at Mellon Institute and an improved mainspring alloy at Battelle Memorial Institute, both for Elgin.

26a-31. Small Foundries Can Engage in Research and Development. Harry Czyzewski. *American Foundryman,* v. 13, March 1948, p. 54-56.

Ways in which research can be done without exorbitant outlays, including use of cooperative research groups, equipment manufacturer's research, and research institutes.

26a-32. The Interrelation of the Engineering and Metallurgical Industries. Arthur P. M. Fleming. *Foundry Trade Journal,* v. 84, Feb. 19, 1948, p. 169-175.

A survey of complementary developments. (Presented at meeting of Institute of British Foundrymen.)

26a-33. Industrial Uses of Selected Minerals. Guide List of Industrial Uses of Mineral Resources. *U. S. Department of Commerce, Industrial Series No.* 72, 35 pages.

A listing of 200 commercially significant minerals with their principal industrial uses.

26a-34. Metallurgical Tracers and Naval Research. Julius J. Harwood. *Journal of the American Society of Naval Engineers,* v. 60, Feb. 1948, p. 49-63.

A brief description of the fundamental principles involved. A number of metallurgical projects, involving use of radioactive tracers, being worked on for the Navy at the Carnegie and Stevens Institutes of Technology.

26a-35. Metallurgical Books. Sibyl E. Warren. *Metals Review,* v. 21, March 1948, p. 25, 27.

First installment of a bibliography, classified by subject matter, of metallurgical and near-metallurgical books published during 1936-1946 inclusive. This installment covers process metallurgy. Neither selective nor annotated. (To be continued.)

26a-36. Manufacturing Advances in Wartime Germany. John L. Kent. *Scientific American,* v. 178, April 1948, p. 161-164.

Following machines and processes: cold steel extrusion; salt-bath heat treatment; high-speed

trip magnet; powder metallurgy; and boring-milling machines.

26a-37. Metallurgy and Atomic Energy. (Continued.) C. Hubert Plant. *Metallurgia,* v. 37, Feb. 1948, p. 178-180; March 1948, p. 248-252.

Most advantageous elements for liberation of atomic energy are those at the two ends of the periodic table. The use of atomic energy as an aid in the development of new alloys or as an aid to present-day metallurgical processes. (To be continued.)

26a-38. The Metallurgical Laboratories of the B. W. R. A. J. G. Ball. *Welding,* v. 16, March 1948, p. 106-112.

Organization and equipment of the metallurgical laboratories of the British Welding Research Assoc. in London. Main features of the present research program.

26a-39. New Research and Development Laboratories Opened by Canadian Westinghouse Co., Ltd. *Canadian Metals & Metallurgical Industries,* v. 11, March 1948, p. 16-17.

Facilities and equipment of new chemical, physical, electrical, and metallurgical laboratories.

26a-40. Low Temperature and Some of Its Effects Upon the Behavior of Matter. S. C. Collins. *Science,* v. 107, April 2, 1948, p. 327-333.

Surveys field. 35 ref.

26a-41. The United States Atomic Energy Commission. R. P. Johnson. *Journal of Engineering Education,* v. 38, March 1948, p. 440-445.

An address discusses research activities.

26a-42. Research in Australia. *Engineering,* v. 165, Feb. 13, 1948, p. 161-162; March 12, 1948, p. 245-246.

Research facilities and activities in diverse fields.

26a-43. Coke Oven Machinery. Ragnar Berg. *Iron and Steel Engineer,* v. 25, April 1948, p. 98-104; discussion, p. 104-105.

Constructional and functional features of machinery used in connection with operation of a battery of coke ovens. (Presented at A.I.S.E. Annual Convention, Pittsburgh, Sept. 25, 1947.)

26a-44. Materials at Work. *Materials & Methods,* v. 27, April 1948, p. 72-75.

A new department consisting of brief descriptions and illustrations of methods by which progressive engineers are taking advantage of the properties of materials—both new and old. Items are as follows: alloy tubing; cast iron welded to sheet steel; stainless-steel helicopter blades; sound-deadening metal; rhodium-plated aluminum; roughing-up castings; plastic gas pipes; and formed springs by the strip.

26a-45. The British Iron and Steel Research Association as Typified by the Battersea Laboratories. M. W. Thring. *Research,* v. 1, April 1948, p. 320-324.

A plan for the development of a physics department to serve the steel industry. Physics of metals, instrumentation, heat transfer and pyrometry, flow of gases, molten steel and molten slag, and the mathematical theory underlying these processes.

26a-46. Isotopes and Their Application to Peacetime Use of Atomic Energy. Paul Aebersold. *Bulletin of the Atomic Scientists,* v. 4, May 1948, p. 151-154.

Rapid growth in their utilization in varied fields as indicated by shipments and allocations. Distribution of use among eight broad fields of science.

26a-47. Electrochemical and Electrometallurgical Industries. J. W. Cuthbertson. *Reports of the Progress of Applied Chemistry,* v. 31, 1946, p. 306-323.

A review. 111 ref.

26a-48. The New Baillieu Laboratories at Melbourne University. J. Neill Greenwood. *Metal Treatment,* v. 15, Spring 1948, p. 15-16.

Facilities and research programs at above metallurgical laboratory.

26a-49. Compounds of Hydrogen With Metals and Metalloids. Thomas R. P. Gibb, Jr. *Journal of the Electrochemical Society,* v. 93, May 1948, p. 198-211.

Compounds possessing a metal-hydrogen or metalloid-hydrogen bond are classified and their preparation, structure, and properties reviewed briefly. Uses of hydrides. 44 ref. (Prepared for delivery at Columbus, Ohio, meeting of the Society, April 14 to 17, 1948.)

26a-50. How to Maintain and Recondition Lubricants in Metalworking Plants. E. L. H. Bastian. *Steel,* v. 122, May 24, 1948, p. 90-92, 114, 116.

(Presented at General Motors Maintenance Symposium, Detroit, Feb. 12, 1948.)

26a-51. Mellon Institute in 1947-48. *Chemical and Engineering News,* v. 26, May 24, 1948, p. 1518-1523.

Research problems worked on and progress made.

26a-52. New Swedish Metal Research Institute. Erik O. Lissell. *Foundry Trade Journal,* v. 84, May 20, 1948, p. 491-492.

26a-53. Open Swedish Metal Research Institute. Erik O. Lissell. *American Foundryman,* v. 13, June 1948, p. 68-69.
New metal research institute recently opened in Stockholm.

26a-54. Filtration of Insulating Oil Through Adsorbent Materials. E. M. Kipp. *Lubrication Engineering,* v. 4, June 1948, p. 122-124.
Experimental procedure and results to show that such filtration using activated alumina as an adsorbent can extend the useful life of an oil.

26a-55. The Acetylene Cylinder-Industry's Unique Container. Charles Ness. *Welding Journal,* v. 27, June 1948, p. 445-449.
Development of container, which is filled with a porous material to prevent explosion. Methods developed to test safety of the cylinders under unusual conditions such as exposure to flames and high explosives, as well as details of the composition of the filler.

26a-56. German Metallurgical Practice Reviewed. Paul M. Tyler. *Mining and Metallurgy,* v. 29, June 1948, sec. 1, p. 326-329.
Disclosures of postwar technical intelligence investigations.

26a-57. Metallurgical and Economic Problems of Atomic Power Plants. Sumner T. Pike. *Metal Progress,* v.53, June 1948, p. 823-826.
Metallurgical work necessary to provide creep resistant alloys, inert to radioactivity, for tubes at 2000° F. in "boilers" fired by atomic energy; suitable fluids (possibly molten metal) for transferring heat from reactor to engine.

26a-58. Research Work of the Physics Laboratory at University College, London. E. N. da C. Andrade. *British Science News,* v. 1, no. 8, 1948, p. 14-16.
Researches on sound, problems of liquid viscosity, creep of polycrystalline metals, monocrystalline wires, and influence of surface conditions on crystal behavior.

26a-59. Friction and Wear of Metals in the Presence of Liquid Gases. P. I. Riumin and Yu. N. Riabinin. *Engineers' Digest,* (American Edition), v. 5, May-June, 1948, p. 186. Translated and condensed from *Kislorod,* (Oxygen), no. 4, 1946, p. 35-41.
Experiments to determine coefficients of friction and resistance to wear of various metals.

26a-60. The Imperfect Film Lubrication of Sliding Journals. L. Leloup. *Engineers' Digest* (American Edition), v. 5, May-June 1948, p. 200-204. Translated and condensed from *Revue Universelle des Mines,* v. 3, No. 10, 1947, p. 373-419.
Influence of tangential forces on oil-film lubrication of bearings. Critical points and effects of surface condition of various bearing metals as factors in imperfect lubrication.

26a-61. Skinfluence. *Industrial and Engineering Chemistry,* v. 40, July 1948, p. 7A, 10A.
Fundamental work being done on the nature of liquid surfaces. Applications to diverse scientific problems in metallurgy, lubricants, insecticides, polymers, and paints are indicated. It has been found that the surface effect of some liquids extends to a depth of 1000 molecules.

26a-62. Technique of Experimenting in the Factory. Leonard A. Seder. *Mechanical Engineering,* v. 70, July 1948, p. 593-598.
Application of statistical techniques in planning industrial research. Examples dealing with etching of aluminum and bonding resin-coated paper to sheet metal.

26a-63. Gear Lubrication in Modern Industrial Applications. A. F. Brewer. *Steel,* v. 123, July 12, 1948, p. 88-92, 122.
Required lubricant properties, including the mechanisms of lubricant-film failure and resulting breakage or excessive wear of the gears. Different types of gear damage which occur.

26a-64. Metals and Alloys of the Future. Zay Jeffries. *Seventy-Five Years of Progress in the Mineral Industry, 1871-1946* (American Institute of Mining and Metallurgical Engineers), 1947, p. 745-758.
Economic and technological factors.

26a-65. Fulmer Institute, a Counterpart of Mellon. *Chemical and Engineering News,* v. 26, July 19, 1948, p. 2120-2121.
New British "sponsored research" institute, which is specializing in metallurgy to begin with.

26a-66. Protecting the Life of Anti-Friction Bearings. H. O. Smith. *Modern Machine Shop,* v. 21, Aug. 1948, p. 124-130, 132, 134, 136, 138, 140.
Maintenance and lubrication procedures.

26a-67. Studies in Boundary Lubrication. II. Influence of Adsorbed Moisture Films on Coefficient of Static Friction Between Lubricated Surfaces. W. E. Campbell and E. A. Thurber. *Transactions of the American Society*

of Mechanical Engineers, v. 70, May 1948, p. 401-406; discussion 406-408.

Extraordinarily high values of this coefficient between steel surfaces lubricated with straight-chain normal hydrocarbons (heptane to decane) are shown to be due to a film of adsorbed moisture at the solid-liquid interface. Friction measurements are recorded for four fundamentally different lubricant types on steel, brass, and glass in equilibrium with dry air and air of 75% humidity. Friction was raised from 40 to 70% in the high humidity. 16 ref.

26a-68. Studies in Boundary Lubrication. III. The Wear of Carbon Brushes in Dry Atmospheres. W. E. Campbell and Rose Kozak. *Transactions of the American Society of Mechanical Engineers,* v. 70, July 1948, p. 491-496; discussion, 496-498.

The dusting rate of carbon brushes in dry nitrogen against several metals is shown to decrease as the hardness of the metal increases. It was found to be zero on smooth chromium and rhodium surfaces. Results are consistent with recent theories of solid friction.

26a-69. Automobile Engineering Research. *Engineering,* v. 166, July 2, 1948, p. 18-19; **Motor Industry Research Association.** *Engineer,* v. 186, July 2, 1948, p. 8-9.

Some of the equipment and research work in progress in the laboratory of the Motor Industry Research Assoc. in Britain. Equipment includes: a gear-tooth fatigue-testing machine, a bearing-test machine, and a test apparatus for torsional fatigue of crankshafts.

26a-70. Process Research. A. H. Aston. *Engineer,* v. 186, July 2, 1948, p. 2-3; July 9, 1948, p. 28-29.

Technique of factorial design for planning research, in which all of the variables involved are varied at once, and the effects of altering each factor singly or in combination with others are determined by simple group comparisons. Great economy in experimental work over usual methods is claimed.

26a-71. Water-Mixtures as Grinding and Cutting Fluids. William H. Oldacre. *Lubrication Engineering,* v. 4, Aug. 1948, p. 162-165, 186.

Application in metal cutting, and current machine practice as it is affected by water mixtures.

26a-72. Verschleissabwehr. (Protection Against Wear.) Hans Wahl. *Metalloberfläche,* v. 1, June 1947, p. 145-151.

Undesirable effects of wear; defines wear and describes its many different forms; basic principles, and methods of reducing the wear of different metallic and nonmetallic substances. Classification of types of wear and wear protection of a number of substances applied to different functions.

26a-73. Beeinflussung der Ritzhärte durch adsorbierte Flussigkeitsschichten. (Effect of Adsorbed Liquids on the Hardness to Scratching.) Gerhard Bachmann and Liselotte Fiddecke. *Metallforschung,* v. 2, July-Aug. 1947, p. 239-243.

Method of testing the effect of lubricants on the surface hardness of metals at constant and variable loads; the effect of dispersion, cold working, and recrystalization on the "scratch hardness" of lubricated metals.

26a-74. Progress and Work in 1947. *Brown Boveri Review,* v. 35, Jan.-Feb. 1948, p. 3-71.

Developments of the past year in equipment for production of energy; for transmission, distribution, and conversion of electrical energy; for industry and agriculture (including miscellaneous drive mechanisms, electric kilns, electric welding, compressors and blowers); for electric locomotives; for high-frequency, communications, and remote supervisory-control engineering; and for marine equipment.

26a-75. Research on Bearing Alloys. *Engineer,* v. 186, July 30, 1948, p. 111.

A review.

26a-76. Frictional Properties of Lead-Base and Tin-Base Bearing Alloys: Role of the Matrix and the Hard Particles. D. Tabor. *Engineer,* v. 186, July 30, 1948, p. 117-119.

Experiments carried out on typical tin-base and lead-base bearing alloys. Frictional behavior was investigated at room temperature and at elevated temperatures, in the presence and in the absence of lubricant.

26a-77. Friction Oxidation. Hudson T. Morton and Francis G. Patterson. *Institute Spokesman,* v. 12, Aug. 1948, p. 8-10, 18, 23.

Vibration was sufficient to cause the balls and rollers of the bearings to imbed themselves in the races. Simultaneously with the automotive problems, textile customers reported early failures of bearings subjected to vibratory conditions and oscillating motion of small amplitude. A laboratory research program to duplicate operating conditions and determine the cause of failures is reviewed.

26a-78. Nuclear Energy and Metallurgy. I. Historical Aspects. II. The Nucleus. III. Modern Alchemy. C. Hubert Plant. *Metal Industry,* v. 73, Aug. 13, 1948, p. 123-125; Aug. 20, 1948, p. 146-148; Aug. 27, 1948, p. 163-165, 173.
A review.

26a-79. British Metallurgical Progress. Eric N. Simons. *Machinery Lloyd* (Overseas Edition), v. 20, Aug. 14, 1948, p. 68-72.
Recent developments.

26a-80. Where Will Ultrasonics Fit in the Power Field? Chester R. Earle. *Power Generation,* v. 52, Sept. 1948, p. 86, 88, 132, 134, 136.
Possible applications, including metal testing and soldering.

26a-81. Missive From Moscow. *Industrial and Engineering Chemistry,* v. 40, Sept. 1948, p. 7A, 10A.
Russian work on use of oxygen in miscellaneous chemical and metallurgical processes, on the basis of recent Russian literature.

26a-82. Bearing and Lubricants Center Analyzes Electrical Machinery Problems. Donald F. Wilcock. *Steel,* v. 123, Sept. 20, 1948, p. 94-96.
Four general fields of interest are covered including: sleeve bearings and bearing materials, antifriction bearings and their lubricants.

26a-83. New Commercial Tonnage Oxygen System Eliminates Dangerous Hydrocarbons and Resultant Acetylene Explosions. B. H. Van Dyke. *Steel,* v. 123, Sept. 20, 1948, p. 103-104, 134, 136, 140, 143, 146.
Tonnage-oxygen system developed by Elliott Co., Jeannette, Pa., which utilizes an atmospheric-pressure air-distillation system, combined with a nitrogen liquefaction and refrigeration system in such a manner as to provide a unique combination of features and an unusual degree of safety and flexibility in operation.

26a-84. Nuclear Energy and Metallurgy IV. The Practical Point of View. V. The Future Outlook. C. Hubert Plant. *Metal Industry,* v. 73, Sept. 3, 1948, p. 187-190; Sept. 10, 1948, p. 203-205.
Abstracted from *Metallurgia,* v. 37, Nov. 1947, p. 15-19; and subsequent issues. See items 26a-2, 26a-23, 26a-37, 1948.

26a-85. Problems Encountered by the Royal Electrical and Mechanical Engineers in the Field. E. Bertram Rowcroft. *Institution of Mechanical Engineers, Proceedings,* v. 158, Sept. 1948, p. 178-186.
Previously abstracted from condensation in *Engineering,* v. 165, Jan. 30, 1948, p. 117-120. See item 26a-27, 1948.

26a-86. A Modified Punch Card Filing System for Metallurgical Literature. J. H. Westbrook and L. H. DeWald. *Metal Progress,* v. 54, Sept. 1948, p. 324-327.
System developed at M.I.T. which combines direct sorting, readable classifications of primary and secondary titles of major interest, and coded classification for secondary subjects.

26a-87. Bearing Construction and Performance Characteristics. E. Crankshaw and K. Scheucher. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 109-116; discussion, p. 116-119.
The performance characteristics of bearings of the different alloys and of different designs. Also describes effect of method of casting on microstructure and consequent effect on bearing performance. Examples of bearing failures and their causes.

26a-88. New Swedish Metal Research Institute Opened. Erik O. Lissell. *Foundry,* v. 76, Oct. 1948, p. 142, 145.

26a-89. Laboratory for Study of Cylinder Wear. *Technical News Bulletin* (National Bureau of Standards), v. 32, Oct. 1948, p. 115-117.
Facilities of new National Bureau of Standards laboratory.

26a-90. Boundary Friction. *Petroleum,* v. 11, Oct. 1948, p. 226-228.
Results of research on the boundary lubrication of journal bearings at Liége University, Belgium, as reported in a paper by Lucien Leloup. Equipment and procedure and results with a series of lubricants.

26a-91. Production Engineering Research Association. D. F. Galloway. *Metallurgia,* v. 38, Sept. 1948, p. 279-282.
Facilities and activities of British association. Immediate problems are machinability and formability of metals.

26a-92. Temperature Distribution in the Bush of a Journal Bearing. D. Clayton and M. J. Wilkie. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 333-336. Condensed from *Engineering,* v. 166, July 16, 1948, p. 49-52.

26a-93. Metallurgical Research at the National Physical Laboratory. N. P. Allen. *Metallurgia,* v. 38, Sept. 1948, p. 267-270.
Salient features are outlined. Use of phase-contrast illumination in microscopy and to the replica technique in electron microscopy. Work on the effect, on creep strength, of

a precipitate in a soft matrix and on the appearance of sigma phase in Fe-Ni-Cr alloys, and the possible future of the higher-melting-point metals.

26a-94. A.F.S. Uses Punch Card System to Index Foundry Literature. *American Foundryman,* v. 14, Oct. 1948, p. 29-35.

Punch-card system and code index developed along lines of divisional and committee interests. Use of duplicate cards in case indexing under more than one subject is necessary.

26a-95. Lubricating Aerosols. K. C. Mosier. *Lubrication Engineering,* v. 4, Oct. 1948, p. 217-219.

Use of air-oil fogs or "lubricating aerosols" for continuous, automatic lubrication. Examples of successful application to lubrication of high-speed grinding spindles, as a coolant for various metal-cutting jobs, and as a drawing and stamping lubricant.

26a-96. Methods of Lubricating High-Speed Ball Bearings. A. F. Brewer. *Machinery,* v. 55, Oct. 1948, p. 172-178.

Various lubrication systems and their pros and cons.

26a-97. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery,* v. 55, Oct. 1948, p. 179-191.

Alloys and materials used in connection with miscellaneous metal-processing applications.

26a-98. Metallurgical Research Now Centered at Midvale. L. A. Creglow. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 556-557.

Research activities of U. S. Smelting, Refining and Mining Co., at Midvale, Utah.

26a-99. Materials at Work. *Materials & Methods,* v. 28, Oct. 1948, p. 92-94.

Ethyl cellulose arc welding holder; aluminum eave troughs; bender for large diameter mild-carbon-steel pipe; molded nylon machine part; vinylidene chloride tubing and fittings; translucent acrylic diffusion panel for providing the light necessary for accurate interpretation of radiographs; and die-cast magnesium furniture.

26a-100. International Conference on the Physics of Metals: Amsterdam, July 1948. Bruce Chalmers. *Research,* v. 1, Oct. 1948, p. 596-601.

Reviews papers presented.

26a-101. Vacuum Metallurgy. Robert A. Stauffer. *Chemistry & Industry,* Oct. 9, 1948, p. S19-S26.

Equipment and procedures for vacuum coating of metals; for their preparation, refining, melting, and heat treatment. 54 ref.

26a-102. Industrial Applications of Radioisotopes. *Iron Age,* v. 162, Oct. 28, 1948, p. 67.

Applications of special interest in the metalworking field: studies of the mechanism of diffusion in metals and material transfer in both dry and lubricated friction.

26a-103. The Importance of Chemical Attack in the Lubrication of Metals. F. P. Bowden. *Journal of the Institute of Petroleum,* v. 34, Sept. 1948, p. 654-658.

Experimental results which show that the theory that boundary lubrication by long-chain fatty acids or other hydrocarbons is due to an oriented layer of adsorbed molecules on the surface of the metal is an oversimplification, and that chemical attack plays an important part.

26a-104. The Lubrication of Metals by Compounds Containing Sulphur. E. B. Greenhill. *Journal of the Institute of Petroleum,* v. 34, Sept. 1948, p. 659-669.

Mechanism of the action of e.p. lubricants using sulphur-containing compounds of known composition and structure. These results support the view that all e.p. lubricants function as a result of chemical reaction with the moving surfaces. E.p. lubrication becomes a problem in controlled corrosion. 10 ref.

26a-105. The Lubrication of Metals by Compounds Containing Chlorine. J. N. Gregory. *Journal of the Institute of Petroleum,* v. 34, Sept. 1948, p. 670-676.

It is shown that compounds containing reactive chlorine atoms can produce on steel surfaces a film of iron chloride which has extremely good frictional properties, and which will maintain these properties to very high temperatures.

26a-106. Quebec Department of Mines Laboratories. Maurice Archambault. *Canadian Mining Journal,* v. 69, Oct. 1948, p. 138-145.

Organization and facilities.

26a-107. Recent Advances in the Study of the Crystalline State. Lawrence Bragg. *Science,* v. 108, Oct. 29, 1948, p. 455-463.

An address.

26a-108. Lubricating Open Gears. Joseph A. Rigby. *Steel,* v. 123, Nov. 8, 1948, p. 106, 109, 135.

Physical properties required; selecting correct lubrication; improvements in test procedure; and recent accomplishments.

26a-109. Recent Developments in Ferrous Metallurgy. J. W. Donaldson. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 1-5.

In alloy steels, hardenability, high-temperature alloys, precision casting, clad steels, induction heating, surface hardening, and inspection and control.

26a-110. The Application of Metallurgy to Aircraft Design. Leo Schapiro. *Aeronautical Engineering Review,* v. 7, Nov. 1948, p. 29-35.

Various metallurgical developments which have been applied in aircraft design in the present and past. Future prospects. Among the topics considered are precipitation-hardening requirements, atomic structure, single-crystal properties, mechanism of steel hardening, the new high-strength steels, high-temperature applications, and a new metal-manufacturing technique using a water-cooled copper melting chamber that also serves as a mold.

26a-111. Consolidated's Research Plan. R. D. Perry. *Mining World,* v. 10, Nov. 1948, p. 41-42.

Research organization, facilities, and some of the successful chemical and metallurgical developments of Consolidated Mining & Smelting Co., Ltd.

26a-112. Bearing Tests Determine Safe Loads. *Steel,* v. 123, Nov. 22, 1948, p. 88.

Graphical procedure and equipment at National Bureau of Standards for study of bearing performance through measurements of combined frictional and thermal behavior.

26a-113. Logarithmico-Normal Distribution in Breakage of Solids. Benjamin Epstein. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 2289-2291.

A statistical model is constructed for breakage mechanisms and a breakage process is shown to depend on two basic functions. Results are applicable to a variety of problems, especially those involving desired or undesired crushing or breakage, for example, crushing of ore or degradation of coke. 15 ref.

26a-114. Scanning The Field for Ideas. *Machine Design,* v. 20, Dec. 1948, p. 106-109.

Air-jet control of edge position of sheet being processed over rolls; reducing vibration of machine tools for precision finishing by increased damping; gas-shielded, metal-arc, manual method for heavy sections of Al and Al alloys using special gun; self-aligning adjustable sleeve bearing and thrust bearing for precision grinders; and locking design for assembling head to its cylinder.

26a-115. Mechanical Tubing as an Engineering Material. H. R. Clauser. *Materials & Methods,* v. 28, Dec. 1948, p. 91-104.

Types and shapes of mechanical tubing that are available, the ways in which it can be worked and fabricated, and some typical applications. It also gives the principal characteristics and properties of the many different tubing materials.

26a-116. Visible Hot Spots on Sliding Surfaces. (In English.) F. P. Bowden and M. A. Stone. *Experientia,* v. 2, May, 15, 1946, p. 186-188.

It was previously shown by the authors that local temperatures at the surface of sliding metals may reach high temperatures, sometimes of the order of 1000° C. Such temperatures should be more easily reached on nonconducting solids such as glass, but cannot be measured by the thermocouple method. However, it was found possible to determine approximate temperatures by observation of bright spots visually or photographically. Data on the frictional force necessary to give visible hot spots with sliders of different metals, showing relationship to thermal conductivity. These hot spots have been shown to be important in a number of physical processes such as polishing and surface flow of metals, seizure of bearings, and in initiation of chemical reactions by friction and impact.

26b—Ferrous

26b-1. Iron and Steel Research. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 543-546.

British Iron and Steel Research Association facilities and activities.

26b-2. Some Modern Aspects of Steel Plant Lubrication. C. E. Pritchard. *Lubrication Engineering,* v. 3, Dec. 1947, p. 64-68.

26b-3. Developments in Alloy and Special Steels. C. Sykes. *Metallurgia,* v. 37, Dec. 1947, p. 75-79.

Reviews developments under the following headings: heat resisting steel; the overheating of steel; hardenability; hydrogen and hair-line cracks; machinability. 14 ref.

26b-4. 1947 Steelmaking Progress. *Western Metals,* v. 6, Jan. 1948, p. 48-50.

Metallurgical and technical developments at Columbia Steel, Geneva Steel, and other U. S. Steel subsidiaries.

26b-5. Developments in the Iron and Steel Industry During 1947. I. E. Mad-

sen. *Iron and Steel Engineer,* v. 25, Jan. 1948, p. 46-68.

General introduction; blast furnaces; steelmaking; rolling; finishing; furnaces and controls; materials handling; mechanical developments; electrical developments.

26b-6. Electrical Developments in the Steel Industry During 1947. H. W. Poole. *Blast Furnace and Steel Plant,* v. 36, Jan. 1948, p. 76-82.

26b-7. Some New Developments in Steel. *Product Engineering,* v. 19, Feb. 1948, p. 135-136. Based on **New Developments in Steel,** by M. A. Grossmann.

Presented before local chapter of A.S.M., Des Moines, Iowa.

26b-8. Ferrous Physical Metallurgy. M. Baeyertz and W. F. Craig, Jr. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 114-117.

1947 developments in mechanical properties; tranformations; quenching and heat flow; magnetic and electrical properties; and corrosion.

26b-9. New Laboratory for Steel Control. Ralph G. Paul. *Western Machinery and Steel World,* v. 39, Feb. 1948, p. 90-93.

Facilities and layout of spectrographic laboratory believed to be the steel industry's most modern.

26b-10. Review of Iron and Steel Literature for 1947. E. H. McClelland. *Blast Furnace and Steel Plant,* v. 36, Feb. 1948, p. 212-216, 219.

31st annual classified review of iron and steel literature lists books and pamphlets published during 1947, with a few of earlier date not included in the previous review. Brief annotations where considered necessary.

26b-11. Cleaning of Service Water in Steel Plants. S. P. Kinney. *Iron and Steel Engineer,* v. 25, Feb. 1948, p. 56-59.

Self-cleaning water strainer has many potential applications for steel-mill use.

26b-12. Modern Temple to Steel Research. *Modern Industry,* v. 15, Feb. 15, 1948, p. 18, 20.

New Pittsburgh research laboratory of Heppenstall Co.

26b-13. What's in the Future for Atomic Energy in Industry? J. A. Hutcheson. *Steel,* v. 122, March 1, 1948, p. 88-89.

Some of the formidable obstacles to be overcome before commercial use of atomic energy can be achieved.

26b-14. Former Wasteland Now Western Steelmaking Enterprise. G. Eldridge Stedman. *Steel,* v. 122, March 8, 1948, p. 128, 130, 132, 135, 138.

Integrated steel plant at Geneva, Utah. Additions to plate mill will afford production of light-gage flat-rolled stock for conversion to cold strip at West Coast plants.

26b-15. Considerations in the Fabrication of Stainless Steel. A. S. Tuttle. *Canadian Metals & Metallurgical Industries,* v. 11, Feb. 1948, p. 18-22, 35-36.

Fundamental principles; properties; compositions; methods for welding, forming, heat treatment, and machining; and choice of the proper alloy for the job. Table gives compositions; physical, mechanical, and electrical properties; heat treatment schedules; heat resistances; weldabilities, machinabilities; ana abilities to be drawn or stamped.

26b-16. Coil Spring Research. *Wire Industry,* v. 15, Feb. 1948, p. 112, 118.

Research progress on four different problems in connection with coil springs by the Coil Spring Research Organization in Britain.

26b-17. Modern Trends in Nickel Steel and Cast Iron Gear Materials. Charles M. Schwitter. International Nickel Co., 1948, 20 pages.

Compositions, properties, test data, processing methods. 23 ref.

26b-18. The Automobile Industry That's Behind the Iron Curtain. Part III—Research and Development of Russian Motor Vehicles. D. B. Shimkin. *Automotive Industries,* v. 98, April 1, 1948, p. 30-33, 53-54.

Soviet research in motor vehicles is said to be very ineffective for various reasons. Soviet tests and experience with Lend-Lease vehicles. A common drawback was unsuitability for operation at the extremely low-temperatures common in the Soviet Union. Among the post war advances of importance is the development of a Cr-Mn-Ti steel for gears. 104 ref. (9 English, 95 Russian.)

26b-19. Weight of Steel Bar for 1000 Pieces. *American Machinist,* v. 92, April 8, 1948, p. 141.

Nomograph type chart is used to determine the weight of round-steel bar stock required for 1000 pieces of known diameter and length within a range of approximately 0.10 in. diameter by 0.20 in. long to 1½ in. diameter by 4 in. long.

26b-20. Czechoslovakia; Postwar Iron and Steel Production. J. Jicinsky. *Iron and Steel,* v. 21, April 1948, p. 133-134. Condensed from *Hutnické Listy.*

26b-21. Gage of the Future. Gold V. Sanders. *Steelways,* May 1948, p. 32.

Research at Cornell on light-gage structural-steel specifications.

26b-22. Automatic Lubrication of Steel Plate and Sheet Machinery. Francis A. Westbrook. *Steel Processing,* v. 34, May 1948, p. 261-263.

Lubrication systems for various types.

26b-23. Iron and Steel. J. Woolman. *Reports of the Progress of Applied Chemistry,* v. 31, 1946, p. 271-289.

A review. 80 ref.

26b-24. Weirton Steel Company. T. J. Ess. *Iron and Steel Engineer,* v. 25, May 1948, p. 16W-34W.

Layout and facilities. Equipment dimensions.

26b-25. The Grease Phase of Steel Plant Lubrication. C. E. Pritchard. *Institute Spokesman,* v. 12, May 1948, p. 4-11.

Grease phase and types of equipment used in production and finishing and auxiliary thereto. (Presented at the 15th Annual National Lubricating Grease Institute Convention, Chicago, Oct. 16-18, 1947.)

26b-26. Steel Industry Electrification Trends. L. A. Umansky. *Electrical Engineering,* v. 67, Aug. 1948, p. 774-775.

A general discussion. 16 ref.

26b-27. The Technical Trends in Steel Research. E. C. Bain. *Steel Processing,* v. 34, Aug. 1948, p. 432-433, 439-441.

Condensed from a lecture reviewing progress in research. (To be continued.)

26b-28. Recent Metallurgical Developments. L. Sanderson. *British Steelmaker,* v. 14, Aug. 1948, p. 376-379.

Results of research for improved cleaning and finishing methods together with new developments in analysis, corrosion-resistant processes and a novel means of cutting metal developed in Russia.

26b-29. The Technical Trends in Steel Research. Part II. (Concluded.) E. C. Bain. *Steel Processing,* v. 34, Sept. 1948, p. 477-478, 494.

26b-30. British Iron and Steel Research Association. *Metallurgia,* v. 38, Sept. 1948, p. 270-272.

Activities during the past year.

26b-31. The British Cast Iron Research Association. J. G. Pearce. *Metallurgia,* v. 38, Sept. 1948, p. 273-275.

Nodular cast irons are the outcome of a comprehensive program of research on the mechanism of graphite formation. Other work in progress, or completed during the past year.

26b-32. Who Discovered Stainless Steel? Carl A. Zapffe. *Iron Age,* v. 162, Oct. 14, 1948, p. 120-129.

While this thought-provoking article does destroy many popular myths concerning the discovery of stainless steels, it is based entirely on factual information in published records. 55 ref.

26b-33. Lubricants for Cold Rolling Steel. R. J. Nekervis and R. M. Evans. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 72-80, discussion, p. 80-81.

Progress report on an investigation in which a substitute for palm oil was sought. Chemical factors, and lubricant requirements which had to be considered. Lubricating properties were evaluated by measurement of friction coefficient on a laboratory cold rolling mill. Methods of determining rolling performance and effect of workhardening on lubricant ratings and methods for evaluating cleaning properties and luster. Study of palm oil and its fractions and of various types and blends indicated little difference in coefficient of friction and luster.

26b-34. Alloy Steel in War—Then and Now. Clyde Williams. *Metal Progress,* v. 54, Oct. 1948, p. 485-488, 490.

The development of metallurgical materials, especially during the past 75 years and during World War II, for use in the machinery of war.

26b-35. The Technical Trends in Steel Research. E. C. Bain. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1222-1225, 1240. A condensation.

Previously abstracted from *Steel Processing,* v. 34, Aug. 1948, p. 432-433, 439-441; Sept. 1948, p. 477-478, 494. Condensed from a lecture reviewing progress in research.

26b-36. Equipment for the Steel Plant. *Metals Review,* v. 21, Oct. 1948, p. 11, 13, 15, 17.

Commercial products, processes, and techniques developed during the past 12 months under headings: blast-furnace refractories; other refractories; handling equipment; casting methods; new steels; mill equipment; sheet, strip and wire; and laboratory equipment.

26b-37. Metallurgical Books. Sibyl E. Warren. *Metals Review,* v. 21, Oct. 1948, p. 33, 35, 37, 39, 41.

Seventh installment of classified bibliography of books published during 1936-1946, inclusive, consists of sections on metals in general and their analysis, and the various sections and subsections dealing with ferrous metals.

26b-38. Quebec-Labrador—Canada's Iron Ore Jackpot. Tom Campbell. *Iron Age,* v. 162, Nov. 4, 1948, p. 155-161.

The story of new ore development, its personalities, prospects, and present status.

26b-39. Onderzoekingen van Franse Metaallaboratoria over speciale staalsoorten. (French Metallurgical Research on Special Steels). André Michel. *Metalen,* v. 3, Oct. 1948, p. 31-35.

Some developments of the past five years on temper brittleness; overheating and temper brittleness; impact values; influence of texture on mechanical properties; properties of steel; corrosion embrittlement of steel; properties of bainite structures; and creep. (To be continued.)

26b-40. The Great Labrador Venture. *Fortune,* v. 38, Dec. 1948, p. 114-121, 142-144, 146, 149-150.

How Canadian and U. S. enterprise are cooperating to develop Labrador iron ore.

26b-41. Making While Mending; Section Mill Reconstruction at Appleby-Frodingham While Maintaining Output. *Iron and Steel,* v. 21, Nov. 1948, p. 463-467.

How British steel rolling mill was rebuilt while production was maintained.

26b-42. Electric Steel in the United States at Forty-One. Clarence G. Merritt. *Transactions of the Electrochemical Society,* v. 91, 1947, p. 147-152; discussion, p. 153-154.

Previously abstracted from preprint. See item 26-60, 1947.

26c—Nonferrous

26c-1. Rare and Minor Metals; Survey of the Progress Made by German Investigators. *Metal Industry,* v. 71, Dec. 12, 1947, p. 483-485.

Condensed from B.I.O.S. report.

26c-2. Metallic Titanium is Light, Strong, Durable, and Corrosion Resistant. E. A. Gee, J. R. Long, and W. H. Waggaman. *Materials & Methods,* v. 27, Jan. 1948, p. 75-78.

Supply situation, manufacturing methods, properties, and present potential uses.

26c-3. Copper and Copper Alloys; a Survey of Technical Information During 1947. E. Voce. *Metallurgia,* v. 37, Dec. 1947, p. 80-84.

58 references.

26c-4. Copper Metallurgy. F. M. Shepard. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 95-96.

1947 developments in production methods.

26c-5. Nonferrous Physical Metallurgy. Walter R. Hibbard, Jr. *Mining and Metallurgy,* v. 29, Feb. 1948, p. 118-126, 155.

Fundamental research developments of 1947 under the headings: effects of temperature; dislocation theory; plastic deformation; grain-boundary effects; mechanical straining; age-hardening; light metals; diffusion; gases in metals; recovery, recrystallization, and grain growth; and constitution.

26c-6. Copper and Copper Alloys; A Survey of Technical Information During 1947. E. Voce. *Metallurgia,* v. 37, Jan. 1948, p. 141-145.

Corrosion and protection; powder metallurgy; joining; electroplating and finishing; physical metallurgy and testing; scrap and industrial waste. 115 ref.

26c-7. Standards. Edition 2, Copper & Brass Research Assoc., New York, Feb. 11, 1947, 70 pages.

Indexed and tabulated standards for mill products of copper, brass, bronze, and related alloys.

26c-8. Surface Active Agents as Applied in Nonferrous Metal Technology. J. Koernar. National Lead Co. Research Laboratories, Brooklyn, 9 pages.

Theoretical and practical considerations as applied to soft-solder fluxes, etching solutions, cleaning solutions, wetting down of dusty drosses, and other applications.

26c-9. The Story of Tantalum. Clarence W. Balke. *Chemistry & Industry,* Feb. 7, 1948, p. 83-86.

Occurrence, preparation and fabrication methods, and uses. Also discusses columbium briefly.

26c-10. Health Experiences in the Fields of Manufacture and Use of Beryllium Alloys and Beryllium Compounds. Beryllium Corporation, Reading Pa., 1948, 4 pages.

Data which indicate that little or no hazard is involved. 13 ref.

26c-11. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications— Part XVIII. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, March 1948, p. 163-168.

Platinum metals and potassium.

26c-12. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications—Part XIX. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, April 1948, p. 217-223.

Selenium, tellurium, and silica.

26c-13. Nonferrous Metals. Ernest S. Hedges. *Reports of the Progress of Applied Chemistry,* v. 31, 1946, p. 290-305.

A review. 90 ref.

26c-14. Seventy-Five Years of Progress in Nonferrous Metallurgy. W. M. Peirce. *Seventy-Five Years of Progress in the Mineral Industry, 1871-1946* (American Institute of Mining and Metallurgical Engineers), 1947, p. 199-222.

26c-15. Porous Bushings. H. A. Unckel. *Metal Industry,* v. 73, July 23, 1948, p. 67-70.

Results of an investigation undertaken to obtain data on the frictional characteristics of porous bronze and iron bushings in the usual speed and loading ranges. Comparisons between bushings made from porous bronze, sintered iron and solid tin-bronze rod.

26c-16. Studio sul berillio. Le leghe rame-berillio (Study of Beryllium. Copper-Beryllium Alloys.) Luigi Losana. *La Metallurgia Italiana,* v. 39, March-April 1947, p. 55-70.

Data concerning chemical composition, properties, heat treatment, methods of production, and corrosion resistance of different types of Cu-Be alloys. 13 ref.

26c-17. Le laboratoire des usines métallurgiques Suisses Selve & Co., Thoune. (Laboratory of the Swiss Metal Fabricator, Selve & Co., Thoune.) (Also in German.) Theophil Zurrer. *Pro-Metal,* v. 1, March 1948, p. 32-41.

Facilities and work of laboratory, which is devoted to work on various nonferrous metals and alloys. Large folding chart gives compositions, physical and mechanical properties, applications, and standards for copper alloys produced commercially in Switzerland.

26c-18. Research in the Non-Ferrous Metals Industry. The Position and Work of the B.N.F.M.R.A. G. L. Bailey. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 143-149.

First of series of articles which will survey research activities in and for the nonferrous industries of Great Britain.

26c-19. Metallurgical Books. (Concluded.) Sibyl E. Warren. *Metals Review,* v. 21, Nov. 1948, p. 39, 41, 43.

Final installment of book bibliography lists books on nonferrous metals published during 1936-1946.

26c-20. Titanium—A Modern Metal. Julius J. Harwood. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 443-460.

Availability, preparation of ductile titanium, properties, corrosion resistance, present and potential applications, and government and industrial research programs.

26c-21. Etalement des huiles sur les métaux. (Spreading of Oils on Metallic Surfaces.) René Dubrisay and Francois Arlet. *Comptes Rendus,* v. 227, Sept. 6, 1948, p. 531-533.

The influence of small additions of higher aliphatic acids to pure paraffin oils was studied in connection with spreading on an electropolished copper surface.

26d—Light Metals

26d-1. Western Metals Forum. *Western Metals,* v. 5, Dec. 1947, p. 31-33.

The question: "What can be done to increase use and usefulness so as to help make magnesium a metal of today?" is discussed by A. C. Byrns, Edmund T. Price, Ivan Bloch, E. B. Parker, Leo B. Grant, and N. H. Engle.

26d-2. Magnesium and Its Alloys; a Review of Technical Progress During 1947. R. G. Wilkinson. *Metallurgia,* v. 37, Dec. 1947, p. 85-90.

14 ref. (To be continued.)

26d-3. Magnesium and Its Alloys; a Review of Technical Progress During 1947. R. G. Wilkinson. *Metallurgia,* v. 37, Jan. 1948, p. 133-136.

73 references.

26d-4. Aluminium-Legeringen. (Aluminum Alloys.) A. Swagerman. *Metalen,* v. 2, Feb. 1948, p. 109-117.

World production of aluminum compared to the production of some heavy metals for the last 15 years. Production methods. Compositions, properties, casting methods, testing, and applications of cast aluminum alloys.

26d-5. How to Work Aluminum and Its Alloys. Anderson Ashburn. *American Machinist,* v. 92, July 1, 1948, p. 85-100.

Special report covers alloying ingredients; nomenclature; strain hardening; thermal treatments; properties; machining; shearing; blanking and punching; bending; forming; drawing; spinning; casting and forging; joining; and cleaning and finishing.

26d-6. Aluminium Laboratories Limited.

A. W. J. Dyck. *Canadian Chemistry and Process Industries*, v. 32, Sept. 1948, p. 830-834.

Facilities of research laboratory at Kingston, Ont.

26d-7. Aluminum Company of America Sums Up Its Research in Housing With an Experimental Aluminum Home. *Sheet Metal Worker*, v. 39, Oct. 1948, p. 42-43.

SECTION XXVII

BOOKS

27a—General

27a-1. **Design of Machine Members. Ed. 2.** Alex. Vallance and Venton L. Doughtie. 559 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York. $4.50.

A thorough reference work on the design of machine elements, from welded and riveted joints to bearings and gears. Numerous changes and revisions have been made and some chapters have been largely rewritten. Includes numerous typical problems.

27a-2. **Dictionary of Machine Shop Terms.** A. C. Tolford. 292 pages. 1947. American Technical Society, Chicago, Ill. $0.75.

All the terms with which a mechanic should be familiar in order to pursue his trade effectively. A number of words and terms not directly related to shop work are included for their value in general use.

27a-3. **Metallurgy for Aircraft Engineers, Inspectors and Engineering Students.** R A. Beaumont. 273 pages. 1946. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London, England.

Deals chiefly with alloy structural steels, casehardening steels, light alloys, and copper and its alloys, which are used in aircraft construction. The production of steel, mechanical methods of working steel, steel composition, structure, and heat treatment, defective materials and processes, mechanical testing, and temperature measurement equipment. Tables of specifications are included.

27a-4. **Proceedings Third Annual Spring Meeting of Metal Powder Association.** 70 pages. Metal Powder Association, 420 Lexington Ave., New York 17, N. Y. $2.50.

Subjects covered are stainless steel powder, new developments in production of powder-metal parts (at Ford); cost calculations; and a panel discussion on: apparatus for air classification of metal powders; bearings, bushings and allied products; copper-lead bearings from metal powder; electrical components from metal powders; and metal powders as pigments.

27a-5. **The Story of Scrap.** Edwin C. Barringer. 152 pages. Institute of Scrap Iron & Steel, Inc., 1536 Connecticut Ave., N.W., Washington 6, D. C. $2.75.

The basic facts of the scrap industry coupled with a semitechnical description of the leading scrap-consuming processes. Development of the scrap industry; the source of scrap and the role of dealers and brokers; statistics and specifications for the various grades of scrap.

27a-6. **Tests With Circular Plates. (In English.)** Ake Holmberg. 118 pages. 1946. Generalstabens Litografiska Anstalts Forlag, Stockholm, Sweden. (Royal Swedish Academy of Engineering Sciences, Proceedings No. 190.)

A method for empirically determining moment distribution in plates or other structural elements which are difficult to treat mathematically, e.g., shells. Application of this method to circular plates in some particular cases of load Details of the apparatus used and results obtained with steel plates. Nomographs correlate average test data.

27a-7. **Powder Metallurgy.** Paul Schwarzkopf. 379 pages. 1947. Macmillan Co., 60 Fifth Ave., New York 11, N. Y.

The revised workbook and notebook of a successful powder metallurgist is divided into four sections: processing, products, theoretical principles, and future developments, each followed by a bibliography. The book is said to have been written under the unusual circumstances of complete freedom to disclose information obtained during 30 years' work in the field. 454 ref.

27a-8. **Corrosion of Metals With Oxygen Depolarization.** N. D. Tomashoff. 258 pages. 1947. Academy of Sciences, Institute of Physical Chemistry of the U.S.S.R., Moscow and Leningrad.

In addition to a theoretical analysis of general problems of electrochemical corrosion, the author gives an exhaus-

tive treatment of corrosion processes that occur with oxygen depolarization. Emphasizes the theory and experimental study of cathodic processes.

27a-9. Sandvikens Handbook. Del 12. Svetsning. (Sandviken's Manual No. 12. Welding.) K. A. Ringdahl. 124 pages. Sandvikens Jernverks Aktiebolag, Sandviken, Sweden. 2.50 Kr.

A comprehensive survey of the principles of the various welding processes and the types of equipment used in Sweden. Chapters include the various forms of arc welding and gas welding; the more recent forms of gas and arc welding such as atomic hydrogen and Argonarc; resistance welding with examples of the different types of equipment and their particular applications. Includes a brief outline of the fundamentals of welding metallurgy, gas cutting and various methods of brazing. Lists of Swedish welding standards, welding organizations, literature available, and a short glossary.

27a-10. A.S.M.E. Boiler Construction Code. Section II. Material Specifications. 544 pages. 1946. American Society of Mechanical Engineers, 29 W. 39th St., New York.

27a-11. DoAll Contour Saws. Ed. 12. 416 pages. The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Free to those requesting on company letterhead.

Revised and enlarged in order to include a new section on instruction programs for use in a shop or school training course. The techniques for contour sawing and filing, as well as high-speed sawing and friction-cutting methods with band-sawing equipment. Compares the performance of these machines with other basic machine tools. Contour saw and file applications.

27a-12. Bibliography on Nickel Compounds in Refractories; 1927-1946. 5 pages. July 1947. Industrial Chemicals Section, Development and Research Department, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Consists of 14 abstracts plus author and chronological indexes.

27a-13. Illustrated Jig-Tooling Dictionary. T. G. Thompson and R. A. Peterson. 349 pages. 1947. Macmillan Co., 60 Fifth Avenue, New York, N. Y. $7.50.

Basic fundamentals of tooling. Definitions of terms used with tables of decimal equivalents, trigonometric functions, cutting speeds and like information.

27a-14. Nomography. Alexander S. Levens. 176 pages. January 1948. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $3.00.

Theory and construction of charts involving straightline scales, curved scales and combinations of these. How to use these charts in various technical fields.

27a-15. Elementary Mechanical Vibrations. Austin H. Church. Pitman Publishing Corp., 2 West 45th St., New York 19, N. Y.

Basic principles required for solution and understanding of vibration problems.

27a-16. Engineering Organization and Methods. James E. Thompson. 227 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y. $4.00.

How to administer an engineering department well.

27a-17. A Method of Semiquantitative Spectrographic Analysis. C. E. Harvey. 285 pages. 1947. Applied Research Laboratories, Glendale, Calif. $10.00.

Method requiring no prepared standards provides approximate quantitative analyses of most elements which can be detected spectrographically in the d.c. arc source. 258 pages of tables covering the elements investigated.

27a-18. Industrial Experimentation. K. A. Brownlee. 116 pages. 1947. Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N. Y. $3.75.

Statistical methods for pilot-plant and plant-scale experiments on chemical manufacturing processes.

27a-19. The Boilermaker's Assistant. John Courtney. 108 pages. Technical Press, Ltd., Gloucester Road, Kingston Hill, Surrey, England. 5s.

Design of plate work for various types of tanks, boilers, and appropriate fittings, including the construction of templets. Design of boilers and the materials of construction.

27a-20. The Experimental Study of Structures. A. J. S. Pippard. 114 pages. 1947. Edward Arnold & Co. London, England. 9s.

Addressed to teachers and based on a short course of lectures and experiments. The principal elastic theorems and methods of stress analysis are summarized, and the most important section deals with the application of Clerk Maxwell's reciprocal theorem. Other chapters cover strain energy and distribution methods, experimental study of arches and a short description of experiments with sand.

27a-21. How to Run a Lathe. Ed. 45. 128 pages. South Bend Lathe Works, 383 E. Madison St., South Bend 22, Ind. Paper-bound, 25¢; leatherette-bound, $1.00.

Operation of the lathe units; grinding cutter bits; making accurate measurements; plain turning; chuck work; taper turning; boring; drilling; ream-

ing; tapping; and cutting screw threads.

27a-22. Research in Action. Edition 2. 59 pages Battelle Memorial Institute, Columbus, Ohio.

Illustrated brochure describes Battelle's research activities in minerals beneficiation; fuels and combustion; metallurgy; ceramics; chemistry; physics; agriculture; graphic arts; production research. Also outlines Battelle's founding, organization, development, mode of operation, functions of the service departments, wartime research, future prospects, and activities in fundamental research and research education.

27a-23. Theory of Limit Design. J. A. Van Den Broek. 144 pages. 1948. John Wiley and Sons, Inc. 440 Fourth Ave., New York 16, N. Y.

The theory of elasticity and the theory of limit design are both used at present. The author claims that the former involves numerous assumptions which are little more than wishful thinking. The latter theory supposes ductile or semi-ductile stress distribution.

27a-24. Encyclopedia of Chemical Technology. Vol I. Raymond E. Kirk and Donald F. Othmer, editors, 982 pages. 1947. The Interscience Encyclopedia Inc., 215 Fourth Ave., New York 3, N. Y. $20.00.

This work is neither a dictionary nor a handbook, nor is it a series of technological monographs for the benefit of advanced specialists. Rather it is designed to present the entire field of chemical technology. The subject matter is descriptive of technologically important matrials, methods, and phenomena. It is not primariy theoretical and mathematical, except insofar as such treatment is necessary to bring out well-established principles and to provide background. The bibliographies are not exhaustive but are intended as selected reading lists. In presenting each subject, the aim is to give a balanced account excluding controversial or hypothetical material. The articles were written by authorities in each field and have been reviewed by one or more specialists. This volume covers "A to Anthrimides", The coverage is very broad, including, for instance, metallurgy, ceramics, fuels, lubricants, plastics and rubbers, coatings and many other subjects.

27a-25. Principles and Practice of Heat Treatment. J. Winning. Edition 2. 108 pages. 1945. Emmott & Co., Ltd., 31 King Street West and 21 Bedford St., Strand, London, W. C. 2, England.

Equipment and processes for thermal treatment of carbon and alloy steels, stainless and rustless steels, and nonferrous alloys.

27a-26. The Plater's Handbook. R. Cruickshank Ltd., London, England. 135 pages.

Various processes used in electroplating and much information of a practical nature. The information given is not confined to proprietary materials. A comprehensive chapter on the analysis of solutions.

27a-27. The Motor Industry Research Association; Second Annual Report. 59 pages. Oct. 1947. The Association., Great West Road, Brentford, Middlesex, England.

Summary of research programs on: Stresses in vehicle structures; stiffness of vehicle structures; filtration of libricating oil; bearing materials; gears; fatigue strength of crankshafts; exhaust-valve and cylinder-head temperatures; operation of engines on leaded fuels; design and positioning of piston rings; application of electrical strain gages; deep-drawing of sheet metals; fuel injection in spark-ignition engines; and piston ring flutter.

27a-28. Handbook of Horizontal Boring, Drilling, and Milling Machines and Their Application. 266 pages. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. $5.00.

Complete information on horizontal boring, drilling, and milling machines including their construction, fields of application, operation, and productive possibilities. In loose-leaf form in order to permit later information to be added.

27a-29. 1946 Car Builders' Cyclopedia of American Practice. Roy V. Wright. Edition 17. 1444 pages. 1946. Simmons-Boardman Publishing Corp., 30 Church St., New York 7, N. Y.

Railroad and industrial cars, their parts and equipment; cars built in America for export to foreign countries; descriptions and illustrations of shops and equipment employed in car construction and repair.

27a-30. The Problem of Metal Corrosion. (El Problema de la Corrosion Metallica.) Emilio Jimeno. 237 pages. 1947. Ministerio de Marina, Instituto Espanol de Oceanografia, Madrid, Spain.

Importance of metal corrosion and theories behind it and attempts to apply the electron theory to explain numerous phenomena inexplicable otherwise. The electrochemical nature of corrosion is covered in detail.

Effects of humidity, temperature changes, and various attacking agents, including organisms and incrustations are mentioned. Means of protection against attack—both external and internal—are given. The study was made in cooperation with the Spanish Institute for Oceanography.

27a-31. The Corrosion Handbook. Edited by H. H. Uhlig. 1188 pages. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $12.00.

This new handbook, sponsored by The Electrochemical Society, Inc., and written by 103 authors, is a condensed summary of information about corrosion, including both scientific data and industrial experience. Discussion is concerned primarily with the behavior of metals and alloys at ordinary and elevated temperatures, and with the protection of metals against corrosion. There are sections dealing with the theory of corrosion (36 p.) and with corrosion testing (150 p.). Throughout the book, emphasis is on quantitative information. A Section on Special Topics in Corrosion (235 p.) includes chapters on corrosion by sea water, corrosion by soils, corrosion by micro-organisms, fundamental behavior of galvanic couples, hot and cold water systems, boiler corrosion, corrosion by lubricants, and the effect of mechanical factors in corrosion (stress corrosion). The sections on corrosion in liquid media, the atmosphere and gases, and on high-temperature corrosion are subdivided according to materials, which are discussed as follows: aluminum and alloys; cobalt and alloys; copper and alloys; iron and alloys; lead and alloys; magnesium and alloys; nickel and alloys; tin and alloys; zinc and alloys; precious metals; miscellaneous metals, and nonmetallic materials. In addition there are separate sections on materials resistant to high temperature and materials resistant to particular chemicals. T.L.

27a-32. Waterbury's Handbook of Engineering. Edition 4. H. W. Reddick. 386 pages. 1947. John Wiley & Sons, Inc., 440 Fourth Ave., New York. $2.50.

Formulas, equations, and numerical tables needed for use in general engineering work, with two major exceptions: the table of natural logarithms and chemical equations and tables. Field engineers, test men, students, and laboratory technicians will find this handbook useful for reference on the job. Engineering offices will probably find larger and more complete handbooks of better use in reference work.

27a-33. 49th Annual Report of the Mining Industry of the State of Idaho for the Year 1947. 256 pages. 1948. State of Idaho, Boise, Idaho.

Reports of accidents, items of general interest pertaining to mining, speeches given at various meetings, an extensive classified bibliography of Idaho's mineral resources, and a descriptive directory of all mines, listed by county. Statistical data is included in various sections of this report.

27a-34. Electrical Resistance Welding —A Bibliography of the Literature From Jan. 1936 to June 1947. Harold S. Card. 22 pages. The Author, 850 Euclid Ave., Cleveland. $1.00.

Data on 646 articles published in 49 technical and industrial magazines during the above period. Many of these titles are accompanied by synopses. The entire list has been indexed according to subject matter. Current standards publications and books are included.

27a-35. Bentley's Machine Shop Companion. 181 pages. Bentley Publishing Co., 31 King Street West, Manchester 3, England. 2s6d.

New edition has been thoroughly revised and considerably enlarged. It covers very adequately the needs of the machine-shop foreman and his men.

27a-36. Practical Design Handbook for Engineers. Alois Cibulka. 400 pages. Clarke & Courts, Houston, Texas. $6.00.

A reference book rather than a text, this volume presents in tabular and chart form a wealth of data in the mechanical, hydraulic, and structural fields. In a concise manner it reviews the fundamentals of the subject, presents a typical problem worked out in detail, and follows up with tables of data required for calculations. Much data and many shear diagrams of statically-indeterminate types, pressure vessels, shafts, gearing, and hydraulics. Useful mathematical and conversion tables.

27a-37. El Problema de la Corrosion Metalica. (Metallic Corrosion.) 237 pages, 1947. Ministry of Marine, Spanish Institute of Oceanography, Madrid, Spain.

A résumé of the economic losses due to corrosion and of the organizations tackling the problem in various countries. Mechanisms of corrosion of various types, and methods of protection. Up-to-date information given by authors of various nationalities. Few numerical data are given, attention being concentrated on principles.

27a-38. L'Electrochimie et L'Electrometallurgie. Tome I. Electrolyse. Tome II. Fours Electriques. (Electrochemistry and Electrometallurgy. Vol. I. Electrolysis. Vol. II. Electric Furnaces.) Edition 6. Albert Levasseur. 175 and 203 pages. 1947. Dunod, 92 Rue Bonaparte, Paris 6, France.

Vol. I covers electrolysis in aqueous solutions, its theory and applications, including a brief appendix on chemical uses of the electrical discharge. Vol. II is devoted entirely to electric furnaces, and their design, construction, and uses.

27a-39. An Introduction to Silicate Industries. H. N. Bose. 84 pages. 1947. Ceramic Publishing House, Church Road, Bhagalpur, India.

A short text on glass, enamels, pottery, limes, cements and plasters, and refractories and pyrometry.

27a-40. Metal Process Engineering. Norman E. Woldman. 291 pages. 1948. Reinhold Publishing Corp., 330 W. 42nd St., New York.

A text book covering various practical phases such as casting, mechanical working of metals and alloys, forging, powder metallurgy, joining of metals, castings vs. forgings vs. welds, heat treatment, surface hardening, machining of metals, and toolsteels. References are included at the end of each chapter.

27a-41. Running a Machine Shop. F. H. Colvin and F. A. Stanley. Edition 2. 521 pages. 1948. McGraw-Hill Book Co., 330 W. 42nd St., New York. $4.25.

This practical guide to practices for both large and small shops covers subjects from methods of determining what kinds of jobs the shop can best handle to a complete toolroom system. The new material in this edition deals largely with management problems.

27a-42. Chemistry of Engineering Materials. Ed. 4. Robert B. Leighou. 666 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. $4.50.

As in previous editions, stress is placed on the chemical properties of engineering materials so that these materials may be more intelligently selected and used. The only requirement for the reader is a knowledge of elementary general chemistry. References are given at the end of each chapter. Subject matter covered includes water for steam generation; fuels, combustion, and lubricants; refractories; nonferrous metals and alloys; production of iron and steel; alloys of iron; technology of shaping metals and alloys; corrosion of metals and alloys; protective metallic and inorganic coatings; building stones; lime and gypsum products; portland cement and concrete; clay and clay products; abrasives; glass; organic plastics; natural and synthetic rubber; organic protective coatings; glues and adhesives; and insulating materials. (From review in *India Rubber World*, v. 118, April 1948.)

27a-43. Fundamentals of the Theory of Statistics. Elementary Statistics and Applications. Sampling Statistics and Applications. Ed. 1. James G. Smith and Acheson J. Duncan. 720 and 498 pages. 1944 and 1945. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Constitutes a set of 2 volumes. Principles of gathering and presenting statistics, frequency-distribution analysis, probability theory and the normal curves, correlation, time-series analysis, and forecasting. The 2nd volume, intended for advanced students or research workers, discusses the general theory of frequency curves and the theory of random sampling. Illustrates applications to a variety of problems.

27a-44. Manual of Structural Design. Edition 3. Jack Singleton. 336 pages. H. M. Ives & Sons, Topeka, Kansas. $6.00.

A collection of original tables, design charts and specifications useful in solution of structural design problems. 1946 simplified list of wide-flange shapes, data on welding and on aluminum, tables of fixed-end moments and on roof decks. Design specifications have been brought up to date.

27a-45. Oxy-Acetylene Welder's Handbook. Edition 4. T. B. Jefferson. 274 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York. $2.50.

Much of the material presented in earlier editions has been rewritten and new illustrations have been introduced. The book has been written in the manner most apt to prove helpful to the student and the small shop welder. (From review in *Welding Engineer*, v. 33, April 1948.)

27a-46. Mechanics for Engineers. Edward R. Maurer, Raymond J. Roark, and George W. Washa. 425 pages. John Wiley and Sons, Inc., 440 Fourth Ave., New York. $4.00.

This text book on statics and dynamics is the third rewriting of Maurer's "Technical Mechanics". Much attention is given to noncoplanar forces in statics. Dynamics, kinematics and kinetics are treated concurrently. Methods of vector analysis are used in the discussions of curvilinear mo-

tion of a particle and of spherical and general motion of a rigid body. D'Alembert's principle receives greater emphasis. Virtual work and mechanical vibrations are added topics.

27a-47. The Fracture of Metals. M. Gensamer, E. Saibel, J. T. Ransom, and R. E. Lowrie. 84 pages. American Welding Society, 33 W. 39th St., New York, N. Y. $1.00. Previously published in *Welding Journal,* v. 26, Aug. 1947, p. 443s-484s.

This report summarizes the literature and also the results of interviews with outstanding men in the field. It represents a compilation of present knowledge of the laws and the fundamental mechanism of fracture. Part I includes the original survey of the literature and an analysis of the theories of fracture and applications of principles. Part II clarifies new developments in the theories of fracture and plastic flow. A recommended research program is outlined. (From review in *Steel Processing,* v. 34, April 1948.)

27a-48. Precision Investment Castings. Edwin Laird Cady. 356 pages. 1948. Reinhold Publishing Corp., 330 W. 42nd St., New York.

Process and its applications. Chapters on design, properties of various metals and alloys, master patterns and molds, methods of investing, and casting.

27a-49. The German Metal Finishing Industry. F. Taylor, L. W. Owen, and A. W. Wallbank. 135 pages. H. M. Stationery Office, 429 Oxford St., London, W. 1, 20s. 6d. (B.I.O.S. Final Report No. 1615, Item No. 21.)

A sequel to B.I.O.S. Report No. 429, "German Electroplating Industry" and Report No. 643, "German Anodizing Practice". Covers some of the targets already visited by previous teams with an object of amplifying and clarifying some of the information contained in these earlier reports. Its main object, however, was to obtain as broad a view as possible of industrial practice for metal-finishing processes. Lacquering and enameling practice were also examined when used in conjunction with phosphate coatings. (From review in *Electroplating,* v. 1, April 1948.)

27a-50. Analysis of Casting Defects. Edition 1. 1947. American Foundrymen's Association, 222 W. Adams St., Chicago 6, Ill.

Written to help foundrymen minimize and eliminate defective castings, this book is the result of seven years' study by a number of experienced gray-iron foundrymen. 31 basic casting defects are listed and described.

27a-51. Rempe Engineering Data Book. Arthur G. Vogel. 34 pages. Rempe Co., 340 N. Sacramento Blvd., Chicago 12, Ill. $1.50.

A reference manual for design of pipe coils and fin coils. Data is included on dimensional limitations, coil development formulas, and heat-transfer factors. Profusely illustrated. Material specification data and tables of various pipe sizes and heat-transfer coefficients.

27a-52. Industrial Electric Furnaces and Appliances. Vol. II. V. Paschkis. 320 pages. 1948. Interscience Publishers, Inc., 215 Fourth Ave., New York.

Covers a field of furnaces in which diversity in design is much more pronounced than in the field covered by the first volume. Resistance furnaces and appliances; induction and high-frequency capacitance heating; and selection of furnaces. An attempt is made to introduce a fairly rigid classification of furnaces and appliances in order to simplify the subject for the student. Information on furnace materials.

27a-53. Metal Spraying and Sprayed Metal. Edition 3. W. E. Ballard. Charles Griffin and Co., Ltd., 42 Drury Lane, London, W.C.2. 32s net.

Previous editions were written by authors who had a purely scientific interest in metal spraying, whereas the present author has been connected with the commercial development of the process for 24 years. Chapters which cover practical features are written in nontechnical language. Some notes are included on use of compressed gas and subsidiary apparatus. The historical section has been considerably shortened. Essential features of the molten-metal, powder, and wire-spraying processes, the latter being dealt with especially thoroughly, as the author has been intimately connected with the process for a long time. Preparation of surfaces for spraying, installation of plant and subsidiary apparatus, special processes such as aluminizing, the nature of sprayed metal, and properties of sprayed surfaces as compared with those protected by other methods; and includes such factors as density, porosity, adhesion of deposits, magnetic and electrical properties, effect of carburizing on sprayed-steel coatings, dopes, heat treatment, corrosion. Well illus-

trated. (From review in *Sheet Metal Industries,* v. 25, March 1948.)

27a-54. Manual of A.S.T.M. Standards on Refractory Materials. 252 pages. Feb. 1948. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

27a-55. Proceedings of the 34th Annual Convention, American Electroplaters' Society. 308 pages. 1948. The Society, Box 168, Jenkintown, Pa.

Meeting of June 1947 at Detroit. 22 papers and accompanying discussion, as well as the usual business reports. Some of the papers were previously abstracted from other sources. The rest are being abstracted separately at this time.

27a-56. Practical Drilling Tests. D. F. Galloway and L. S. Morton. 232 pages. Production Engineering Research Assoc., Staveley Lodge, Melton Mowbray, England.

Based on metal-drilling research carried out by the I.P.E. Research Department, prior to the formation of the Production Engineering Assoc. of Great Britain. Special problems presented by the modern twist drill from all aspects.

27a-57. Friction and Wear of Piston Rings and Cylinders. Reemt Poppinga. 1948. American Society of Lubrication Engineers, 343 S. Dearborn St., Chicago 4, Ill. $3.00 for members; $3.50 for nonmembers. Translated from the German.

This is a wellknown German book. Specific information given is designed to cover the problem of wear in all of its ramifications. 636 ref.

27a-58. Introductory Physical Metallurgy. Clyde W. Mason. 134 pages. 1947. American Society for Metals, Cleveland. $3.00.

A series of lectures on introductory physical metallurgy presented to members of the A.S.M. during the 29th National Metal Congress and Exposition, Chicago, Oct. 18 to 24, 1947. Includes nature and formation of metal crystals; alloys as solid solutions; working and annealing of metals; unmixing of solid and liquid solutions; solid solution in brasses and bronzes, iron, and steel; heat treatment of steels and cast irons; and corrosion.

27a-59. Elementary Physical Metallurgy. Edward G. Mahin. 276 pages. 1948. Chemical Publishing Co., Inc., Brooklyn 2, N. Y.

The microscope and the preparation of metallographic specimens; fundamental properties of materials and their relationship to one another; methods of testing and interpretation of test results. Treatments of hardness, thermal analysis, pyrometry, and phase diagrams.

27a-60. Photo-Elasticity. Vol. II. Max Mark Frocht. 505 pages. 1948. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

A treatise on advanced principles and methods. Essential elements of the theory of elasticity; a critical examination of the influence of physical constants on state of stress in two dimensions; a survey of methods for determination of sums of principal stresses with special emphasis on the numerical solution of Laplace's equations; also theory and technique of three-dimensional photo-elasticity with applications to stress concentrations.

27a-61. Wear and Surface Finish. E. L. Hemingway. 80 pages. Gisholt Machine Co., Madison, Wis.

The measurement of surface finish, methods of finishing, the reasons for wear and its relation to desirable finish. (From review in *American Machinist,* v. 92, May 6, 1948.)

27a-62. An Introduction to the Physics of Metals and Alloys. W. Boas. 193 pages. 1947. John Wiley & Sons, Inc. 440 Fourth Ave., New York 16, N. Y. $3.50.

Properties of metals and alloys in terms of properties of atoms and how to produce a material with desired properties. Properties and arrangement of crystals determine properties of polycrystalline aggregates. Principles of X-ray analysis, properties and deformation of metals, and phase changes in alloys.

27a-63. Strength of Materials. Joseph Marin. 464 pages. 1948. Macmillan Company, New York, N. Y. $4.75.

Part I deals with stresses; mechanical properties and design of members subjected to tension, compression, transverse and torsional shear; bending; bending and axial stresses; and with columns. Part 2 deals with combined stresses and their determination. Includes theories of failure and design. Part 3 discusses statically indeterminate stresses and describes the deformation method and energy method. Part 4 considers riveted and welded joints and other special problems.

27a-64. Chemical and Electroplated Finishes; the Protective Treatment of Metals. H. Silman. 414 pages. 1948. Chapman & Hall, Ltd., 37 Essex Street, W.C. 2, London.

Finishes commercially applied to metals for decorative and protective purposes from aqueous solutions with or without use of electric current. A comprehensive account of modern industrial finishing processes, together with the chemical and physical principles involved in them.

27a-65. Plant Layout Techniques. John R. Immer. 55 pages. Buf Advertising Co., 404 W. 48th St., Minneapolis, Minnesota. $1.75.

Intended primarily for the student, this book stresses the flow of materials. Principles of assembly-line layout, progressive assembly, specialization of labor, straightline production, jigs and fixtures, flexibility, subassembly, and continuous flow of production. Emphasizes cost considerations. Flow charts and diagrams, drawings, templets, and scale models. (From review in *American Machinist,* v. 92, May 6, 1948.)

27a-66. Kinematics of Machines. Leon Marr Sahag. 249 pages. Ronald Press Co., 15 E. 26th St., New York, 10, N. Y. $4.00.

Text is divided into separate chapters, in each of which the study of motions relative to particular mechanisms is discussed in detail. The graphic method is applied to the solution of problems in velocities and accelerations. (From review in *Modern Machine Shop,* v. 20, May 1948.)

27a-67. Design of Metal Cutting Tools. Frederic L. Woodcock, 406 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Practical application of the tool to the job, how to salvage worn-out tools and adapt them to new uses, and how tools are made to function accurately and economically. Fundamentals of design, including elements of cutting, materials, heat treatments, and fluids, and practical procedures and easy-to-follow instructions on the design of broaches, cutters, drills, hobs, punches, dies, reamers, and other tools.

27a-68. Some Basic Techniques in Materials Handling. 84 pages. Clapp & Poliak, 350 Fifth Ave., New York 1, N. Y. $1.00.

A report of the proceedings at technical sessions of the Conference on Materials Handling, Cleveland, Ohio, Jan. 1948. 19 papers are included.

27a-69. Tvrde Kovg, Obrabeni Materialu, Vyvoj Tvridych Kovu a Jejich Pouziti. (Hard Facing Materials and Their Applications.) Edition 2. Vydalo Nakladatelstvi. 274 pages. 1947. Prace v Praze, Prague, Czechoslovakia.

Hard metals for machine tools. Manual covers metal-cutting fundamentals and economic considerations, the production and use of carbides and other hard metals, and effective combinations of tool types and metals to be cut. An historical survey of the hard metals, information on shop layout, and installation of new tool types. (From review in *Mechanical Engineering,* v. 70, April 1948.)

27a-70. Siderurgie en Electrosiderurgie. (Metallurgy and Electrometallurgy.) Albert De Sy. 450 pages. 1947. N. V. Standaard Boekhandel, Antwerp, Belgium. 430 Belgian francs.

Two volumes of a series of three expanded from a manual of instruction for students in the state university in Ghent. Volume I is a text on general metallurgy and covers such topics as metallurgical operations, fuel and its application to metallurgy, metallurgical furnaces, and refractories. Processes of roasting, smelting, fuming, electric heat treatment, electrolysis, and sintering. Volume II treats the particular subject of ferrous metallurgy, and deals with such topics as pig iron, blast furnaces, and steelmaking. (From review in *Mechanical Engineering,* v. 70, April 1948.)

27a-71. Fundamental Principles and Applications of Induction Heating. 147 pages. 1947. Chapman & Hall, Ltd., London, W.C. 2, England. 10s 6d.

The development and applications of industrial heating, as well as principles of induction and coil design and choice of frequency equipment. Applications to surface hardening, internal hardening, tempering, forging, and other processes. (From review in *Mechanical Engineering,* v. 70, April 1948.)

27a-72. German Engineers' Tool Industry. C. H. Booth and others. 200 pages. 1947. The authors, Brooklyn, New York. $10.00.

Prepared by the British Intelligence Objectives Committee, this survey presents individual reports on various types of tools as well as the general report. (From review in *Mechanical Engineering,* v. 70, April 1948.)

27a-73. Symposium on Powder Metallurgy; Special Report No. 38. Edition 2 (Revised.) 208 pages. Dec. 1947. Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W. 1, England.

An introductory historical note and 27 papers in the following groups: preparation, properties, and testing of metal powders; magnetic powders and products; hard metal

carbides; porous-metal components; and the manufacture and properties of sintered components. Individual papers are being abstracted separately.

27a-74. S.A.E. Handbook 1947. 822 pages. 1947. Society of Automotive Engineers Inc., New York 18, N. Y. $10.00.

New material includes specifications for hydraulic brake fluids, standards for serrated shafts, nomenclature and definitions for three types of crankcase oil, standards for pipe, filler, and lubrication fittings, specifications for automotive steel castings, and general information on welding electrodes and on copper and silver brazing. Other standards and specifications have been reviewed and revised. (From review in *Foundry,* v. 76, May 1948.)

27a-75. Form Tools. William F. Walker. 301 pages. Hutchinsons Scientific & Technical Publications, 47, Princes Gate, London, S.W. 7, England. 25s net.

Flat tools, circular form tools, tangential tools, dovetail form tools, and form tools with rake. Other topics discussed are tool materials, methods of holding, design, manufacture, grinding, and the use of form tools. (From review in *Machinery* (London), v. 72, April 15, 1948.)

27a-76. Chamber's Mineralogical Dictionary. Edition 2. Chemical Publishing Company, 26 Court St., Dept. M. C., Brooklyn, N. Y. $4.75.

A popular British work beautifully illustrated with 40 colored plates. Lists over 1400 minerals, and gives chemical compositions, crystal forms, physical properties, occurrences, and uses. (From review in *Steel Processing,* v. 34, May 1948.)

27a-77. Le Formulaire des Engrenages. (A Manual for Gear Design.) Charles Macabrey. 367 pages. Dunod, 92 Rue Bonaparte, Paris 6, France. 750 francs.

Theoretical and practical requirements and many recent developments. Gear-tooth gaging and inspection methods as well as strength of gear teeth and forces called into play by various types and systems of gearing. Types of gearing include spur, stub-toothed, straight-bevel, spiral, hypoid, Zerol, Gleason, Maag, and worm gears. An interesting chapter is concerned with elliptical and hyperboloidal gears. Other subjects touched upon include roller and silent-chain gearing. Various gear cutting, generating, and finishing methods. (From review in *Machinery* (London), v. 72, April 15, 1948.)

27a-78. Seventy-Five Years of Progress in the Mineral Industry (1871-1946). A. B. Parsons, Editor. 817 pages. 1947. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York, N. Y. $6.00.

Part I is composed of historical papers wherein experts in the fields of mining and metallurgy have reviewed: significant developments in mining geology (L. C. Graton); metal mining (Lucien Eaton); ore dressing (A. F. Taggart); smelting and leaching of ores (F. Leist); iron and steel (C. D. King); nonferrous metallurgy (W. M. Peirce); bituminous-coal mining (H. N. Eaverson); anthracite industry (C. Evans and others); petroleum (E. L. DeGolyer); nonmetallics (Oliver Bowles); and mineral-industry education (T. T. Read). Part II contains the proceedings of the World Conference on Mineral Resources. Particularly significant are The Mineral Position of the United States, by J. A. Krug; Iron Ore and the Steel Industry, by Charles M. White; International Aspects of the Petroleum Industry, by William Fraser; The Future of Gold in World Economy, by P. M. Andersons; World Coal Resources, by C. Augustus Carlow; The Role of the Engineer in the Development of Atomic Energy, by P. C. Keith; Application of Atomic Energy to Industry, by H. A. Winne and B. R. Prentice; and Metals and Alloys, by Zay Jeffries, in a chapter by E. W. Pehrson, Mineral Economics Branch, U. S. Bureau of Mines, the entire 75-year statistical record is presented. (From review in *Science* v. 107, May 14, 1948.)

27a-79. Quin's Metal Handbook and Statistics—1947. F. B. Rice-Oxley, compiler. 452 pages. 1948 Metal Information Bureau, Ltd., Princes House, 39 Jermyn St., London, S.W.1, England.

Statistics, and standard classifications and conditions of sale for nonferrous scrap metals.

27a-80. Rubber to Metal Bonding. S. Buchan. 239 pages. 1948. Crosby Lockwood & Son Ltd., London, England.

Process utilizes brass plating as a bonding agent in the manufacture of rubber-metal units. Plating procedures, cleaning solutions, natural and synthetic-rubber compounding, mechanism of the rubber-to-brass bond, and use of non-brass bonding cements.

27a-81. Metallurgical Materials and Processes. John Elberfeld. 188 pages.

1948. Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y.

General background in science of metals. Grain structure; constitution diagrams; heat treatment furnaces and their controls; forming of metals; welding metallurgy; powder metallurgy; and laboratory procedures.

27a-82. **Stress Analysis and Design of Elementary Structures. Ed. 2.** James H. Cissel. 419 pages. John Wiley and Sons, Inc., 440 4th St., New York, N. Y. $5.00.

Primarily intended to give a working knowledge of fundamental methods in structural design to engineers, architects, and students not specializing in the field.

27a-83. **Bibliography on Wire (Manufacture, Treatment, and Properties), Including References to the Cold-Drawing of Bars.** 146 pages. Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W. 1, England.

An extremely careful compilation of the literature on wire drawing. Covers the period up to, and including, 1946, but on the earlier work only the more important references are given. One section deals exclusively with dies and their attendant problems. (From review in *Industrial Diamond Review,* New Series, v. 8, May 1948.)

27a-84. **Directory of Machines, Apparatus and Tools.** Ed. 14. 1947. Bureau de Documentation Industrielle, Hugo Buchser, Geneva, Switzerland.

Precision engineering, apparatus, instruments and tools. A companion volume to the guide for the watch industry. Indexes in five different languages: English, French, German, Spanish and Italian. (From review in *Industrial Diamond Review,* New Series, v. 8, May 1948.)

27a-85. **Transactions of the Electrochemical Society.** v. 91. 723 pages. 1947. The Society, Columbia University, New York, N. Y.

Directory of officers, committees, divisions of the society, and local sections of the society. Society awards and titles of winning papers. Minutes of the 91st general meeting of the Society held at Louisville, Kentucky, April 9, 10, 11, and 12, 1947. Technical papers presented at this meeting, which have been previously abstracted from preprints when of metallurgical interest.

27a-86. **Magnetic Materials.** F. Brailsford. 156 pages. Methuen & Co., Ltd., London, England. 6s net.

A comprehensive outline of the present state of knowledge of the subject. Ferromagnetism; the properties and theory of single crystals; some factors affecting magnetic properties; iron and silicon-iron alloys; nickel-iron and other alloys; and permanent magnet materials.

27a-87. **Applied Physics: Electronics; Optics; Metallurgy.** C. G. Suits, George R. Harrison, and Louis Jordan, editors. 456 pages. 1948. Little, Brown and Co., Boston, Mass. $6.00.

Volume in the series "Science in World War II" reports to the public the work done by the Office of Scientific Research and Development. Operational use of radar countermeasures in the war. Second section deals with optical instruments of all kinds: cameras, binoculars, light and heat detectors, and camouflage. Third section describes specific fields of metallurgical research and participating agencies. Work done on aircraft metals, armor, guns, metals for particular services, and an examination of enemy materiel.

27a-88. **Fundamentals of Stress Analysis.** Vol. 1. Albert Deyarmond and Albert Arslan. 356 pages. *Aero Digest,* Book Dept., 515 Madison Ave., New York 22, N. Y. $3.50.

Based on a course of study taught by the authors under the National Defense Training Program, it is intended to provide the student with a practical understanding of the principles of stress analysis. Background of knowledge regarding types of structures, types of stresses and strains, forces and couples, and the laws of statics; structures with axial loads in the members, stresses in beams, torsional stresses, section properties and allowable stresses. (From review in *Aero Digest,* v. 56, June 1948.)

27a-89. **Vibration in Machinery.** W. A. Tuplin. 111 pages. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London.

Presents the subject with a minimum of mathematics. Multimass systems, vibration-exciting influences, torsional and transverse vibration, and reduction of vibration stresses at critical speeds. Use of flexibility to diminish vibration and measurement of vibration. Machinery failures due to vibration. (From review in *Machinery* (London), v. 72, May 20, 1948.)

27a-90. **Sbornik Dokladov po Dinamicheskoi Prochnosti Detalei Machin.** (Collection of Reports Concerning Dynamic Strength of Machine Parts.)

253 pages. 1946. Academy of Sciences of the U.S.S.R., Moscow and Leningrad, Russia.

Eighteen reports presented at meeting of the Institute of Machine Technology and the All-Union Scientific Engineering-Technical Association for Machine Construction, held in May 1941. Theoretical and practical aspects of design and stress analysis. Abstracts of some of the individual papers also appear in this issue.

27a-91. The Modern Metallurgy of Alloys. R. H. Harrington. 209 pages. 1948. John Wiley & Sons, Inc., 440 4th Ave., New York, N. Y.

Correlates modern theory with practical data, including the fundamentals of a new field of alloy treatments.

27a-92. Metals Handbook. 1948 Edition. Taylor Lyman, Editor. 144 pages. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $15.00.

This almost completely rewritten version of the A.S.M. Metals Handbook contains an array of facts indispensable to those in the metallurgical field. While many tables and diagrams are included, most information is presented in the form of articles stressing fundamental and essential aspects of various subjects. Main divisions of the book include a General section dealing with shaping of metals, welding, mechanical testing, nondestructive inspection, heat treating, surface treatments, structure and properties of metals and like topics; a Ferrous Metals section in which (among other topics) manufacturing, shaping, alloying, testing, hardening of the stainless, tool, and other steels and irons are discussed; a Nonferrous section containing data on properties, manufacturing and fabricating methods for all of the nonferrous metals and their alloys; and a concluding section of phase diagrams of the alloy systems. A complete index makes the information in the Handbook readily available.

27a-93. Precision Workshop Methods. H. J. Davies. 324 pages. Edward Arnold and Co., London, England. $5.

Compiled from notes used in teaching a course in machine shop work for engineering students. An appendix giving information for calculating measurement of effective diameter of V-threads and a description of the British standard system of limits and fits for engineering.

27a-94. Modern Workshop Technology. Vol. 1. H. Wright Baker, Editor. 445 pages. Cleaver-Hume Press, Ltd., 42a S. Audley St., London, W. 1, England. 28s.

Surveys materials and processes employed in the engineering industries. It is divided into seventeen sections each written by a specialist. The subjects covered are: Iron and steel, cast iron, foundry practice, forging, drop forging, structure and heat treatment of steel, surface hardening of steel, steel sheet and strip, welding, application of welding to general engineering, aluminum and magnesium, nickel and high-nickel alloys, copper and copper alloys, die casting, powder metallurgy, engineering plastics, testing, and inspection.

27a-95. Le Soudage Electrique par Resistance. (Electrical Resistance Welding.) Jean Negre. 432 pages. Publications de la Soudure Autogene, 39 Rue d'Amsterdam, Paris 8e, France. 1350 francs.

Methods of resistance welding and their industrial applications, with special emphasis on spot welding. Fundamentals affecting the production of spot welded asemblies, the strength of spot welds, machine and electrode design, control systems, and special types of resistance welders. Seam and butt welding, and welding problems involved in work on various aluminum alloys, stainless steels, and the welding of dissimilar materials.

27a-96. An Introduction to Metallic Corrosion. U. R. Evans. 211 pages. Edward Arnold & Co., London, England.

Intended for university students, scientists having no knowledge of the particular field, and others who encounter corrosion problems. General principles are explained and illustrated with examples.

27a-97. Korroziya Metallovs Kislorodnoi Depolyarizatsei. (Corrosion of Metals with Oxygen Depolarization.) N. D. Tomashov. 258 pages. 1947. Academy of Sciences of the U.S.S.R., Moscow and Leningrad, U.S.S.R.

Results of a number of years' work on the corrosion of metals. A theoretical analysis of some general problems of electrochemical corrosion, and an exhaustive treatment of corrosive processes which take place during oxygen depolarization. (Includes a seven-page summary in English.)

27a-98. Sampling Inspection. Statistical Research Group, Columbia University. 395 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $5.25.

Elementary concepts of acceptance sampling; and standard sampling-inspection plan; presented with detailed instructions so that the principles developed and plans provided can be put to practical use in industrial plant.

27a-99. The Science & Practice of Welding. Edition 3. A. C. Davies. 446 pages. 1947. Cambridge University Press, Cambridge, England.

Basic theoretical principles underlying various processes of welding and practical methods of applying them. Engineering drawing.

27a-100. Metal Statistics: 1948, Annual Edition 41. 848 pages 1948, American Metal Market, 18 Cliff Street, New York 7, N. Y. $2.00.

General assortment of statistical information on ferrous and nonferrous metals, and miscellaneous economic subjects.

27a-101. Colorimetric Methods of Analysis. Ed. 3. Vol. I. Foster Dee Snell and Cornelia T. Snell. 239 pages. 1948. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y.

Theory, instruments, and pH determinations. Nephelometric and turbidemetric methods. New equipment and methods of spectrophotometry, filter-photometry, photo-electric filter-photometry, and hydrogen-ion analysis.

27a-102. Salt Baths for the Treatment of Metals. T. A. Hood. 116 pages. Nov. 1947. Munitions Supply Laboratories, Dept. of Munitions, Commonwealth of Australia, Maribyrnong, Victoria, Australia. (Information Circular 9.)

Heat treatment of high speed, stainless and other steel, patenting of steel wire, solution heat treatment and annealing of aluminum-base and copper-base alloys, cleaning of ferrous metals, cyaniding, liquid nitriding, and liquid carburizing of steel. Construction and characteristics of various types of salt bath furnaces.

27a-103. Modern Metallurgy for Engineers. Ed. 2. Frank T. Sisco. 499 pages, 1948. Pitman Publishing Corp., 2 W. 45th St., New York, N. Y.

Two new chapters on hardenability of steel and one or more sections in practically every other chapter have been added. A considerable portion of the material contained in the first edition has been at least partially rewritten. (From review in *Materials & Methods,* v. 27, June 1948.)

27a-104. Alloys for Use at High Temperature—Report on Visit to Germany and Austria. W. J. Robinson. 79 pages. 1947, Mapleton House, 5415 17th Ave., Brooklyn, N. Y. $4.50.

The materials which had been developed to meet these conditions. Testing methods and machines.

27a-105. La Photoélasticité. A. Pirard. 419 pages. 1947. Dunod, 92 Rue Bonaparte, Paris 6, France.

Following an extended discussion of the theory of elasticity, this text takes up the subject of photo-elasticity from both the theoretical and practical points of view. Birefringence and polarization, materials and equipment for photoelastic examination, and practical applications are demonstrated with examples of photoelastic studies. (From review in *Mechanical Engineering,* v. 70, July 1948.)

27a-106. From the Ground Up. Paul M. Tyler. Ed. 1. 248 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y., $3.50.

Facts and figures of the mineral industries of the United States to provide a picture of the economic development and employment of natural resources and how they affect the welfare of the nation. Practical proposals for improving conditions in the industry.

27a-107. Metody Opredeleniya Obrabatyvaemosti Metallov. (Methods for Determination of the Machinability of Metals.) E. I. Fel'dshtein. 144 pages. 1946. State Scientific-Technical Publishing House, Moscow, U.S.S.R.

"Classical" methods for determination of machinability, rapid methods based on short-time tests, and the relationship between mechanical properties and machinability. Development of "face turning" and its application to practical problems.

27a-108. Fracturing of Metals. 311 pages. 1948. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00. (Also *Transactions of American Society for Metals,* v. 40B.)

An introduction by George Sachs, a summary by Wendell P. Roop, and 17 papers, including stress testing, plastic flow and failure, notch testing, and effects of various factors. Individual papers are being abstracted separately.

27a-109. A Brief History of the Science of Metals. Robert Franklin Mehl. 83 pages. 1948. American Institute of Mining and Metallurgical Engineers, Inc., New York, N. Y.

Deals with development of physical metallurgy from a preliminary period, before 1871; 1871 to 1900, 1900 to the present. Includes 364 references.

27a-110. Engineering Machine Shop Practice. Ed. 2. B. Richard Hilton. 189 pages. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, W.C.2, London. 6s.

Written primarily for apprentices in production engineering and others requiring a knowledge of the practical principles of the machine shop. After a chapter on materials of construction, measuring instruments and marking out are dealt with, also manual operations such as filing, scraping, polishing and screwing, and heat treatment. The rest of the book is devoted to the various basic types of machine tools. (From review in *Machinery* (London), v. 73, July 8, 1948.)

27a-111. Resistance et Encombrement Des Engrenages. (Gear Design). 2 vols. J. Bergere. 216 pages. Dunod, 92 Rue Bonaparte, Paris 6, France. 1250 fr.

The space to be occupied by the gearing is correlated with other essential requirements relating to strength, deflection, speed, and fatigue. The action of gearing is analyzed and the various forces involved are thoroughly investigated. A number of fully worked-out examples are included. Vol. 1 contains the text and vol. 2 the diagrams. (From review in *Machinery* (London), v. 73, July 8, 1948.)

27a-112. Designing for Mass Production. Ed. 2. J. R. Fawcett. 142 pages. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, W.C.2, London. 15s.

Assumes that the reader is familiar with ordinary workshop processes and has a knowledge of machine drawing. There are seven chapters dealing with: properties of materials; cast irons and steels; nonferrous metals and plastics; manufacturing processes; interchangeable manufacture; standardization and specialization; and drawings and specifications. All the usual types of machine tools are discussed briefly, also their tooling and the kind of work-pieces for which they are suitable. General information on press-work, welding, and finishing processes. (From review in *Machinery* (London), v. 73, July 8, 1948.)

27a-113. Precision Grinding With the Modern Abrasive Wheel. Ed. 2. 54 pages. A. A. Jones & Shipman, Ltd., Narborough Road South, Leicester, England. 12s, 6d.

Essential, basic, information on correct operation of grinding machines in a form convenient for ready reference, and thumb-indexed into sections and subsections. A useful section is that dealing with defective work, its causes, and correction. Grinding wheel balancing, truing, and dressing are fully treated; also methods of producing a fine surface finish. Coolants and coolant supply are also considered. (From review in *Machinery* (London), v. 73, July 1, 1948.)

27a-114. Plasticity in Engineering. F. K. Th. van Iterson. 184 pages. 1947. Blackie and Son, Ltd., London, England.

Largely restricted to discussion of problems related to materials showing no work hardening, but also deals with mild steel undergoing moderate deformation. A treatment of the brittle-rupture problem is included. The treatment is highly fundamental in character and introduces some radical departures from present concepts. An able presentation of a difficult and controversial subject. (From review in *Journal of Applied Mechanics.* v. 15, (*Transactions of the American Society of Mechanical Engineers,* v. 70), March 1948.)

27a-115. The Mineral Key. Ed. 1. Howard B. Graves. 178 pages. 1947. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Tables list 823 minerals, their chemical formulas, composition, and distinguishing characteristics. Use of the tables is explained, and tests are described which involve only use of inexpensive chemicals and simple apparatus.

27a-116. Machine Tool Research and Development. D. F. Galloway. 79 pages. 1945. Research Department, Institution of Production Engineers, London, England.

Spindles and spindle bearings, including notes on vibration, speed range, influence of bearing clearance of plain bearings, and the problems arising in the use of ball and roller bearings; drives, tool holders, and machine bodies. Attention is also drawn to the position of controls and ease of operation, as well as to various problems of machine testing and standardization.

27a-117. Bibliographic Survey of Corrosion; 1945. Robert D. Misch, James T. Waber, and Hugh J. McDonald. 129 pages. 1948. National Association of Corrosion Engineers, 905 Southern Standard Bldg., Houston, Tex.

A compilation of abstracts on general material and patents.

27a-118. Molybdenum: Steels, Irons, Alloys. R. S. Archer. 391 pages. Cli-

max Molybdenum Co., 500 Fifth Ave., New York, N. Y.

The varied applications of molybdenum as an alloying element. Covers a wide range of materials from wrought to cast steels and from cast iron to nonferrous alloys. An attempt has been made to show the fields of similarity and dissimilarity of the various materials and to indicate some of the factors that may affect the choice of the most economical material for a specific part. Considerable recent information is included, not only on the more prominent developments, but also on the work that has served to clarify the factors affecting the service life of the lower alloy steels.

27a-119. Quality Control. Norbert L. Enrick. 122 pages. The Industrial Press, 148 LaFayette St., New York 13, N. Y., $3.

Application of statistical plans to the control of quality in manufacture. 100%-sampling and process-control methods of inspection. Tables for sampling are presented accompanied with instructions for their use. Sample charts for process control and a method for constructing them. Elementary concepts in tolerances and allowances and one on gaging, and the theory of sampling plans and control charts.

27a-120. The History of Basic Metals Price Control in World War II. Robert F. Campbell. 263 pages. 1948. Columbia University Press, Morningside Heights, New York, N. Y. $3.25.

Methods, standards, actions, and results of wartime control of the prices of steel, copper, lead, and zinc.

27a-121. Dimensional Analysis of Engineering Designs. Vol. 1. Components. (Part I.) His Majesty's Stationery Office, York House, Kingsway, London, Eng. $2.35.

Furnishes the product designer with a means of analyzing a design on sound, logical lines to insure that production and inspection are economical in relation to the known functioning requirements. The basic principles required for determination of basic sizes, tolerances, and allowances.

27a-122. Traité de Chimie Analytique Qualitative Minérale. (Textbook of Analytical Qualitative Mineral Chemistry.) Paul E. Wenger, Roger Duckert, and Yvonne Rusconi, 466 pages. 1946. University Publishing House, Georg & Co., Geneva, Switzerland.

Laws governing modern analytical chemistry, theories of acids, bases, ionization, equilibrium of solutions, indicators, hydrolysis. Reactions of cations and anions of all elements. New reagents and methods of application. Preliminary tests and analytical chemical procedures with new approaches in analyses.

27a-123. Mechanics of Machinery. C. W. Ham and E. J. Crane. 538 pages. 1948. McGraw-Hill Book Co., 330 W. 42nd St., New York.

Revised to include important new subjects, and to incorporate changes and improvements that bring the material up to date. Vibrations and critical speeds in shafts, and the gyroscope. Includes additional material on cams and gears, flywheels, and governors, and on balancing, with particular reference to airplane engines. Drafting room problems of a practical engineering nature.

27a-124. Mining Geology. Hugh Exton McKinstry. 680 pages. 1948. Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y.

Assembling geological data, geological principles of ore search and ore appraisal, application in specific phases of mining, and technological characteristics of ores.

27a-125. Elasticity and Anelasticity of Metals. Clarence Zener. 170 pages. 1948. The University of Chicago Press, Chicago 37, Ill.

Theoretical interpretation of the various types of anelasticity and the new knowledge which has been obtained through such studies. Various types of anelastic effects and their interrelations. A review is giv en of the various types of relaxations which have been found to give rise to anelasticity. Since the variation of the elastic constants of a metal with microstructure is intimately related to these same relaxation processes, a review and interpretation is also given of the dependence of the elastic properties upon the microstructure.

27a-126. Introduction to Tool Engineering. Halsey F. Owen. 150 pages. Prentice-Hall, 70 Fifth Ave., New York, N. Y. $3.60.

Tool engineering fundamentals, problems of designing for low cost production, manufacturing methods and equipment, methods analysis, manufacturing costs and interchangeable manufacture, operation sheets, tooling programs, tool design, and tool cost estimating.

27a-127. Bibliography on Wire (Manufacture, Treatment, and Properties), Including References to the Cold Drawing of Bars. 146 pages. Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W.I., England.

An extremely careful compilation of the literature on wire drawing. Covers the period up to, and including, 1946, but on the earlier work only the more important references are given. One section deals exclusively with dies and their attendant problems. Numerous references to diamond dies and nonferrous metal wires. (From review in *Industrial Diamond Review,* new series, v. 8, Aug. 1948.)

27a-128. Elementary and Applied Welding. Herbert P. Rigsby and Chris Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. $2.00.

Material especially adaptable to the beginning student in both oxyacetylene and arc welding. Basic procedures. The first third of the book is devoted to fundamental aspects including the equipment required, safety measures to be followed, metals used, and types of welds; the remainder of the book is occupied with projects for construction by the welding student.

27a-129. Report of Tenth Annual Meeting. American Coordinating Committee on Corrosion, 1948, 57 pages.

Minutes of meeting held April 6, 1948 at Hotel Jefferson, St. Louis, Mo.

27a-130. The Machine Tool & Engineering Exhibition. London, 1948, 432 pages. 1948. Machinery Publishing Co., Ltd. Clifton House, Euston Road, London, N. W. 1, England.

Descriptions of the machine tools exhibited and advertisements.

27a-131. Workshop Yearbook and Production Engineering Manual (II). H. C. Town, editor, 568 pages. 1947. Paul Elek Pubishers, Ltd., London, England. 35s.

Divided into three sections, the first consisting of a series of specialized articles, on modern machine-tool developments. Section 2 covers a wide field of engineering progress, including power transmission, industrial developments, precision tools, and methods of machining; and offers descriptions of the latest machine tools. In Section 3 are abridged articles from British and American sources providing the latest information on machine design, press operations, gaging and inspection, metal and heat-treatment, welding, electrical and other drives, and controls.

27a-132. Practical Shop Mathematics. Rev. ed. C. A. Felker. (Revised by J. L. Thomson.) 384 pages. Odhams Press, Ltd., Long Acre, London, England. 9s., 6d.

Examples drawn from workshop practice. The mathematics dealt with consists of arithmetic and algebra. It is applied to such practical problems as taper turning, gear calculation, and screw cutting; indexing and spiral milling; calculations on work, power and energy; and measuring instruments.

27a-133. La Pratique de la Soudure Autogene. (Autogenous-Welding Methods.) C. F. Keel. 406 pages. Société Suisse de l'Acétylene, Bale, Switzerland.

Comprehensive manual devoted to the various aspects of gas welding and allied techniques such as cutting, brazing, and surface hardening. Fundamentals and the various types of equipment, but the theoretical side is limited in extent. Gas-welding techniques, joint design, weldability of different metals, costs, and calculation of weld strengths. Of particular interest are some of the jigs for automatic gas welding, in some instances with mechanical feeding of the filler rod.

27a-134. Les Bases de la Résistance Mécanique des Métaux et Alliages. (The Bases of the Mechanical Resistance of Metals and Alloys.) P. Laurant, J. Valeur, and S. Bogroff. 288 pages. Dunod, Paris, France. 1200 fr.

The effects of crystal structure on the properties of metals and their alloys. The properties of monocrystals. Final section is devoted to polycrystals. The relationship of plasticity and the other properties. A bibliography of prewar literature.

27a-135. German Electroplating Industry. G. E. Gardam. 72 pages. 1947. Mapleton House, 5417 17th Ave., Brooklyn. $5.00 (Reproduced from PB32158, Office of Technical Services, Washington.)

Operating processes of some twenty German firms and research institutes, with analyses of solutions used, and other technical data. A translation of a German specification for the testing of zinc-plated parts.

27a-136. Machine Design. M. F. Spotts. 395 pages. Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. $6.65.

Chapters on stress, torsion and strength of materials provide fundamental information necessary for the design of machinery. Confined mainly to machine elements, such as springs, screws, gears, bearings, and belts. Engineering materials, giving characteristics and properties of each along with general definitions.

27a-137. Infra-Red Heating. A. E. Williams. 42 pages. 1947. Emmott & Co. Ltd., Manchester, England. (TP 363 W671i).

The sphere of infrared rays and their applications to industry. Deals with principles of infrared heating, lamp tunnels and ovens, construction of radiant-heat tunnels, and calculation of equilibrium temperatures from heat-transfer data.

27a-138. Involute Gears. W. Steeds. Longmans, Green and Co., Ltd., 6-7 Clifford St., London, W. 1, England. 18s. net.

Straight and helical gears of involute tooth form; bevel and worm gears are not dealt with. Manufacturing processes and the inspection of gears, and most of the copying and generation processes in common use. Modern gear-cutting machinery, gages, and profile-testing instruments.

27a-139. Electroplating: Notes and Problems. Ed. 2. 94 pages. 1948. R. Cruickshank, Ltd., Camden St., Birmingham 1, England. 7s., 6d.

Extensive notes on all phases of the finishing of metals—cleaning and degreasing, barrel polishing and plating, bright dipping, metal coloring, polishing, anodizing and dyeing, and testing. It is essentially a note book and under each heading are given only the main features of each process.

27a-140. Press Die Design and Construction. Parts 1 and 2. Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. 3s., 6d, net, each part. (Machinery's Yellow Back Series, Nos. 24 and 24a.)

The treatment is concise and the sequence logical. Part 1 deals with basic principles of die design and important details such as guide pins, stock supports, and stops; return-type blanking dies and knockout mechanisms; stops, scrap cutters, and shedder pins for return-type blanking dies; and compound blanking and piercing dies. In Part 2 the more complicated press tools are described—progressive blanking and piercing dies; shear-type piercing and cutting-off tools; slug-type cutting-off dies; and piercing, cutting-off, and forming dies.

27a-141. Powder Metallurgy in Practice. 56 pages. Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. 3s., 6d. net. (Machinery's Yellow Back Series, No. 23.)

How parts for various purposes may be made by powder metallurgy, and points to be considered in design. The various methods of powder manufacture and powder properties are briefly dealt with. Typical equipment. Examples of specialized powder metallurgy products.

27a-142. Symposium on Internal Stresses in Metals and Alloys. 485 pages. Institute of Metals, 4 Grosvenor Gardens, London, England. 42s. net. (Monograph and Report Series No. 5.)

Thirty-six papers and accompanying discussion presented at joint meeting of Institute of Metals with the Faraday Society, the Institute of Physics, the Institution of Mechanical Engineers, the Iron and Steel Institute, the Physical Society, and the Royal Aeronautical Society, in Oct. 1947. Papers on measurement of internal stresses, origin of internal stresses, their control and removal, and associated effects.

27a-143. International Industry Yearbook. Lloyd J. Hughlett, editor. 414 pages. 1948. Kristen-Browne Publishing Co., New York, N. Y.

This is the first issue of an annual publication planned to summarize the technological progress achieved in the various fields of engineering and industry. A broad review of significant industrial developments.

27a-144. Journee des Etats de Surface. (Proceedings of Conference on Surface States.) 87 pages. Société Belge des Mecaniciens, Brussels, Belgium.

Consists of seven lectures which were given at a Brussels conference, together with the introduction and conclusions by C. Hanocq. Three papers were given by British scientists and engineers, i.e., by G. I. Finch on the structure of sliding surfaces, and by W. E. R. Clay and F. Nourse on the problems of surface finish as seen by the production engineer. P. Nicolau, Paris, spoke on the problems of industrial control with regard to micro-geometrical differences, O. Goche on electron diffraction, and G. Michcalet on improved methods for the micro-geometrical control of surfaces.

27a-145. Electrolytic Polishing and Bright Plating of Metals. S. Wernick. 1948, Alvin Redman, Ltd., Whitfield Place, W-1, London, England. $6.10 plus postage.

Many practical applications of electro-polishing. In addition, results obtained in many experimental tests are cited, pointing the way in which progress can be expected in the near future. The chapter on bright nickel plating is the most complete to be found anywhere, as is the very ex-

tensive bibliography of over 500 references. The deposition of precious metals is also covered. (From review in *Metal Finishing*, v. 46, Nov. 1948.)

27a-146. Tvrde Kovy. (Hard Metals.) Evzen Hirschfeld. 274 pages. 1947. Vydalo Nakladelstvo, Prague, Czechoslovakia, £2, 10s.

Application of sintered carbides to cutting tools. An excellent contribution to the problem considering the literature available in practically all industrial countries. There appear to be some original contributions in the form of colored plates, indicating the range of application of various sintered carbides and giving service-data and data on the control of the wear of the cutting edge. Russian, Swedish, and Swiss, as well as English, Czech, American, and German types are included. Lists about 112 articles relating to the subject.

27a-147. Process Engineering. William H. Schutt. 309 pages. 1948. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $4.

Procedure for determining the selling price or direct-labor cost of manufactured article. How to make accurate cost estimates and setup efficient production methods directly from a blueprint. Formulas for speeds and feeds of power presses and other machines. Selection of the proper material for economical production.

27a-148. Uber Die Gleichzeitige Bestimmung Des Elastizitäts—Und Schubmoduls An Hand Der Obertöne Eines in Biegeschwingungen Stehenden Stabes. (On the Simultaneous Determining of Elastic and Shearing Moduli With the Aid of the Modes of Bending Vibration in Bars.) Jaakko Wuolijoki. 79 pages. 1947. Technischen Hochschule Finnlands, Helsinki, Finland.

A new method. Details of mathematics as well as of experimental application to wooden bars. Includes a two-page summary in English. 34 ref.

27a-149. Metalwork; Technology and Practice. Oswald A. Ludwig. 397 pages. 1947, McKnight & McKnight, Bloomington, Ill.

An introductory course to the metal trades. Tools, materials, and operations common to many metalworking occupations. Occupations, hand tools, bench work, power saws, metals, care of equipment, drill presses, screw threads, assembling, sheet metal work, art metal work, forging, casting, tool sharpening, metal finishing, inspecting, lathe work, and metal spinning.

27a-150. Gears, Gear Production, and Measurement. A. C. Parkinson and W. H. Dawney. 260 pages. 1948, Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. $4.50.

General principles. Intended for those in the trade who have gear problems, but who have little or no background of basic knowledge of gear forms, and of the range of manufacturing and measuring methods. Special attention is paid to inspection procedure.

27a-151. Quality Control in Industry; Methods and Systems. J. G. Rutherford. 201 pages, 1948. Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. $3.50.

Recommended as a text in industrial engineering courses, this book is also a reference manual for industrial engineers, executives, and supervisors. It covers the organization, administration, and functions of a department. Explaining and illustrating the actual methods of installation, it also gives complete data for the introduction, design and use of statistical sampling techniques. (From review in *Electrical Engineering*, v. 67, Nov. 1948.)

27a-152. Fatigue des Metaux. (Fatigue of Metals.) Ed. 3. R. Cazaud. 318 pages. 1948. Dunod 92, Paris, France. 1650 fr.

The theory and characteristics of fatigue failure of metals in the light of recent developments in the field. Methods and machines for fatigue testing and the influence of various factors on fatigue. The resistance of joints and machine assemblies to fatigue, and to the improvement in endurance of machine parts. Fatigue-limit values for a large number of metals and alloys.

27a-153. Surface Chemistry for Industrial Research. J. J. Bikerman. 464 pages, 1947. Academic Press, Inc., 125 East 23rd St., New York, N. Y. $8.

Fundamentals of surface science—both physics and chemistry—considered in five chapters on liquid-gas surfaces, liquid-liquid, solid-gas, solid-liquid, solid-liquid-gas—solid-liquid-liquid, and electric surface phenomena. Written for men who already know what is being done in their plants and want to know the fundamental explanations of these procedures.

27a-154. The Science and Engineering of Nuclear Power. Edited by Clark Goodman. 540 p. Double spaced typewritten reproduced by photoprinting methods. 1947. Addison-Wesley Press, Inc., Cambridge 42, Mass. $7.50.

It is said that Edwin Reynolds, the mechanical engineering wizard who made Allis-Chalmers a leader

in the steam power plant field, designed one of his most important central station installations on the back of an envelope while in a railroad coach traveling eastward from Milwaukee. It may be suspected that this is a myth, but one glance at this data book for the designer of nuclear power plants will prove that such a superhuman feat will never occur again. The first third of the book is occupied with a discussion of nuclear physics, the fission process, neutron diffusion and nuclear reactions, said to be "elementary", but obviously meat for a postgraduate course, elementary only to the professor who teaches it. "Elementary Pile Theory" (the pile is the energy-generating part of the nuclear power plant) also bristles with mathematical formulas; for example we find that critical size of reactor that will just keep itself going can be found by solving simultaneously two differential equations. Elementary, my dear Watson! The remainder of the book is a compendium of quantitative information on the physical, chemical and nuclear properties of most of the chemical elements, included so the designer can select proper material for the component parts of the power plant, with due reference to their high temperature strength, corrosion resistance, stability under radiation, heat transfer, and neutron cross sections. Seven schematic diagrams of promising power plant arrangements are presented and discussed. The authors of the various chapters were lecturers in seminars at Massachusetts Institute of Technology; most of them did important work on the atomic bomb project. The very fact that this work influenced, as it inevitably must be, by this prior service and knowledge about secret weapon developments, could be cleared by the U. S. Atomic Energy Commission for publication is a heartening reminder that a great amount of work done on the atomic bomb turned out to be of small importance to weapons but valuable to the arts of peace. E.E.T.

27a-155. American Arc Welding Patents. Vol. I. Materials, Accessories. Ed. 2. W. H. Simon, editor. 1948. Modern Technical Book Co., New York, N. Y. $22.60.

Welding patents up to 1948.

27a-156. Theoretical Structural Metallurgy. A. H. Cottrell. 256 pages. 1948. Edward Arnold & Co., 41-43 Maddox St., London W.1, England. 21s. net.

Treats a number of topics from the standpoints of the electron theory of metals and of the statistical thermodynamics of metals and alloys.

27a-157. Quality Control in Production. H. Rissik. Sir Isaac Pitman and Sons, Ltd., Parker St., London, W.C.2, England. 21s. net.

Concerned mainly with application to machine-shop operations. Considerable attention to the use of "relative precision index" as a measure of the capacity of the machine, together with its operator and the material, to meet specified limits or dimensional variation. Importance of instantaneous sampling in preference to random sampling in checking such factors as tool wear and resetting.

27a-158. Allgemeine Werkstoffkunde. (Principles of Industrial Materials.) Hans Stäger. 423 pages. 1947. Verlag Berkhäuser, Basel, Switzerland.

A basic but comprehensive text on their fundamental character and physical properties, including metals and alloys. Molecular theory, states of matter, metallic structure, fundamentals of plasticity, electrical and mechanical properties, corrosion, and heterogeneous gas-solid and liquid-solid systems. 237 ref.

27a-159. 1948 Guidebook and Directory for the Metal Finishing Industries. Ed. 17. 468 pages. 1948. Finishing Publications, Inc., 11 W. 42nd St., New York 18, N. Y. $1.50.

Polishing, buffing, and sanding; cleaning and pickling; electroplating solutions; surface treatments; control and testing; finishing plant engineering. Directories of trade names, manufacturers, and suppliers.

27a-160. Engineering Materials. Ed. 2. Alfred H. White. 686 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $6.00.

Chapters on alloy steels and light metals have been almost completely rewritten. Material on wood, plywood, other laminates, and protective coatings, is almost all new. Recent developments in the materials of airplanes, light-weight trains and prefabricated houses. Fundamental properties of solids; iron and iron-carbon alloys; manufacture of iron and steel; low-alloy steels; high-alloy steels; shaping and fabricating metals; the light metals; the soft metals; bearing metals; corrosion of metals and protection by inorganic coatings; organic protective coatings; plastics, laminates and synthetic coatings. (From review in *Materials & Methods,* v. 28, Nov. 1948.)

27a-161. Turning and Boring Practice. Ed. 3 (rev.) Fred H. Colvin and Frank A. Stanley. 531 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.75.

Material that appeared in the War-Time Supplement has been placed in the proper sections. Many valuable data have been added. These include mandrel and taper work in lathes; precision boring to extreme accuracy; boring bars for special jobs; and further information on application of carbide tools to different classes of work. Coverage includes: operations that can be performed on engine lathes; turret lathes; automatic and semi-automatic lathes; horizontal and vertical boring machines; and precision, or single-point, boring machines.

27a-162. Machine Design. Paul H. Black. 344 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.00.

Basic elements of machine design, including material on machine members and elements, materials and fits, and finishes.

27b—Ferrous

27b-1. Bibliography on the Effect of Nickel and Cobalt Oxides on Ground-Coat Enamels; 1927-1946. 19 pages. July 1947. Industrial Chemicals Section, Development and Research Department, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Presents 83 abstracts taken from *Chemical Abstracts* and arranged alphabetically by first author. Includes a co-author index.

27b-2. Steel Castings. Eric N. Simons. 216 pages. 1947. Chemical Publishing Co., Inc. Brooklyn 2, N. Y. $5.00.

Principles and practice from raw material to finished product.

27b-3. Steel and Its Heat Treatment. Ed. 5. Staff of Battelle Memorial Institute. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Vol. I, $6.00; Vol. II, $4.00.

Principles underlying various types of heat treatment of carbon and alloy steel. Fundamental concepts, definitions and terminology in heat treatment. Volume II deals with the practical aspects of heat treatment, such as prevention of cracking and distortion, preparation of steel for machining and relation to welding.

27b-4. Industrial Radiographic Standards for Steel Castings. Two sets. 31 plates each. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. $30.00 a set, or $55.00 for the two sets.

Reference standards developed by the United States Navy will assist in classifying defects revealed in castings by radiographic inspection. First set comprise X-ray standards and the second gamma-ray standards.

27b-5. New Developments in Ferromagnetic Materials. J. L. Snoek. 136 pages. Elsevier Publishing Co., Inc., 215 Fourth Ave., New York 3, N. Y. $2.50.

Progress made in Holland in research in ferromagnetic materials during the war.

27b-6. Cubicles and Control Desks (Mechanical World Monograph No. 36). F. T. Bennell. 50 pages. Emmott & Co., Ltd., 31 King Street West, Manchester 3, England. 2s. 6d. net.

Steel housings for electrical equipment. Explains the reasons underlying the use of various designs and manufacturing methods.

27b-7. Iron Simply Explained. Eric N. Simons. 203 pages. Paul Elek, 38 Hatton Garden, London.

Comprehensive information about iron in all its aspects from the mining of the ore to the finished product. Chapters on the structure, manufacture, heat treatment, and welding of the various types of iron.

27b-8. The Enameler's Dictionary. 84 pages. 1947. Ferro Enamel Corp., 4150 E. 56 St., Cleveland, Ohio. Free on request.

Besides brief definitions of terms used in enameling, an appendix of useful tables.

27b-9. Hot-Dip Galvanizing Practice. William H. Spowers, Jr. Edition 2. 188 pages. 1947. Penton Publishing Co., 1213 W. 3rd St., Cleveland, Ohio. $6.00.

A fundamental study including varied applications. 346 ref.

27b-10. Transactions of the American Institute of Mining and Metallurgical Engineers. v. 167, Iron and Steel Division, 1946. 799 pages. 1947. The Institute, 29 West 39th St., New York 18, N. Y.

Technical papers, discussions and symposia presented at meetings held Cleveland, Oct. 16-18, 1944; New York, Oct. 25-26, 1945, and Chicago, Feb. 25-28, 1946; also the Howe Lecture scheduled for the New York Meeting, Feb. 1945, which was canceled. The papers have appeared in *Metals Technology* and have previously been abstracted from that source.

27b-11. Directory: Iron and Steel Plants—1948. 461 pages. 1947. Steel Publications, Inc., 108 Smithfield St., Pittsburgh 30, Pa.

Lists companies and officials of operating blast furnaces, steel

plants, rolling mills, by-product coking plants, structural steel plants, and boiler and tank shops in the U. S. and Canada.

27b-12. Institute of Scrap Iron & Steel Yearbook. 98 pages. 1947. The Institute. 1536 Conecticut Ave., Washington 6, D. C.

27b-13. Steel Products Manual. Section 1—Pig Iron and Ferro-Alloys. Section 3—Tie Plate Designs and Punchings. Section 7—Alloy Steel Plates. Section 12—Hot Rolled Carbon Steel Strip. Section 19—Railway Track Materials. 34, 20, 60, 125, and 152 pages, respectively. Oct. 1947. American Iron and Steel Institute, 350 Fifth Ave., New York.

Revised sections of looseleaf handbook devoted mainly to specifications, standard manufacturing and testing procedures, properties and compositions.

27b-14. Metallurgy of Pig Iron. Vol. II. The Blast-Furnace Process. (In Russian.) M. A. Pavlov. 492 pages. 1945. State Scientific-Technical Publishing House for Ferrous and Nonferrous Metallurgy, Moscow, Russia.

Results of a thorough study of the theory of blast-furnace operation. Details of the most modern methods used in the solution of theoretical and practical problems. 268 ref.

27b-15. The Metallurgy of Steel Welding. British Welding Research Assoc., 29 Park Crescent, London, W. 1, England. 15s.

Papers and discussions at the Symposium on the Metallurgy of Steel Welding, held during Oct. 1945. There are three broad divisions in subject matter: Weld Metal, Hardened-Zone Cracking, and Current Researches.

27b-16. Nonmetallic Inclusions in Steel. M. Baeyertz. 135 pages. 1947. American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. $3.00

The nature and origin of the common types of nonmetallic inclusions, and a few of the methods that may be used to study them. It is not a complete coverage of the subject, nor a history of the development, but rather an introductory text for the beginner.

27b-17. Nickel Alloy Steels; Second Edition. 1947. 700 pages. Prepared by the Development and Research Division, The International Nickel Co., Inc., New York City. An assemblage of 38 pamphlets in ring binder.

The first edition of this work, issued in 1934, has been completely revised and expanded some 40% in size, and an even greater number of subjects treated. The scope includes the plain nickel constructional steels, but also the Ni-Cr, Ni-Mo and the Ni-Cr-Mo steels, the Ni-Cr stainless steels and the high nickel-iron alloys. Especially noteworthy additions contain graphs showing the properties of these most useful alloys in various conditions, the section on carburizing (wherein Floyd Harris' exposition of the mechanism and expected results, as printed in *Metal Progress,* is leaned heavily upon), and a masterly condensation of information on the stainless steels. Outside experts have written some of the sections—for example Earle C. Smith, chief metallurgist of Republic Steel Corp., writes on "The Making and Shaping of Alloy Constructional Steels", and Peter Payson, assistant director of research of Crucible Steel Co. of America, on "The Annealing of Nickel Alloy Steels". The book also contains a collection of isothermal transformation diagrams (T.T.T. diagrams) gathered from various sources, and a very interesting set of cooling curves printed on celluloid, showing varying cooling rates from fast to slow, which can be superposed on the T.T.T. diagrams and an estimate made as to the steel's final structure and hardness after a given cooling. (In this reviewer's opinion, the appraisal of conditions during *continuous* cooling, from data acquired during *stationary* temperature dwells, involves such a large extrapolation and so many assumptions that it gives reasonably accurate information only for the extreme cases—quenching or annealing.) E.E.T.

27b-18. Conoscere l'Acciaia. (Know Your Steel.) Vol. I. Bartoli F. Masi. 92 pages. 1945. Poligono Societa Editrice, Via Cesare Battisti I, Milan, Italy.

A simple historical study of steel production covering methods, materials, alloying elements for special steels, crystal structure of cast iron and steel, and practical applications. Dictionary of technical terms used in the steel industry.

27b-19. Das Härteverhalten der Edelstähle. (The Hardness Behavior of Refined Steels.) Jos. Kubasta. 187 pages. 1940. Verlag von Wilhelm Knapp, Halle (Saale), Germany.

Hardness properties and qualities of steel and the possibilities of fracture in hardened steels. Migration phenomena, structural changes, stresses and fractures due to hardening, gas content and melting proc-

esses for various types of special steels. Both tool and structural steels are evaluated.

27b-20. Metodi di Analisi Chimica Siderurgica. (Methods of Analysis of Steelworks Materials.) G. Gavioli. 379 pages. Ulrico Hoepli, Milan, Italy. 1200 lire.

All of the various raw materials entering a steelworks, and all of its products and byproducts—both the older and the more recently developed methods such as gravimetric, volumetric, photometric, potentiometric, and other types. Gas-volumetric method for carbon and the vacuum-fusion method for gases. Reagent preparation, standardization, and recovery. The methods are in line with modern practice and are clearly described along with explanations of their theoretical bases.

27b-21. Yearbook of the American Iron and Steel Institute. 718 pages. 1947. The Institute, 350 Fifth Avenue, New York 1, N. Y.

Proceedings of New York general meeting, May 21-22, 1947. Most of the individual technical papers were previously abstracted from preprints or journal sources. The remainder are being abstracted separately at this time.

27b-22. Grundlagen der Eisengewinnung. (Fundamentals of the Production of Iron.) Robert Durrer. 210 pages. 1947. Verlag Francke, A. G., Bern, Switzerland. 20 Swiss francs.

27b-23. Tool Steel Simplified. Revised edition. Frank R. Palmer and George V. Luerssen. 564 pages. 1948. Carpenter Steel Co., Reading, Pa. $2.00 in U. S.; $2.50 elsewhere.

Subtitled "A handbook of modern practice for the man who makes tools". Presents simplified methods for selecting and heat treating toolsteel, written in clear nontechnical language. Chapters dealing with heat treating equipment and methods, furnace atmospheres, and quenching and tempering have been revised and enlarged. Three new chapters have been added. Chapter 9, longest in the book, is a display of specific recommendations for using the publisher's steels for certain tools. About 200 types of tools and dies are listed. Chapter 13 describes the heat treatment and properties of four steels: 18-4-1 and 6-6-2 high speed steels and 9% tungsten and 5% chromium hot work steels. Chapter 19 discusses the time required to heat toolsteel. The specific data in this chapter are especially valuable additions to the book and should be of direct application in heat treating. T.L.

27b-24. A.S.T.M. Specifications for Steel Piping Materials. 308 pages. March 1948. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Specifications for pipes, tubes, castings, forgings, and bolting.

27b-25. Report on German Blast Furnace Practice and Plant. 57 pages. 1946. British Iron and Steel Federation and British Iron and Steel Research Assoc., London, England.

Prepared under auspices of a British Intelligence Subcommittee. Development of German blast-furnace practice and design during the war. Among the changes in processes and equipment, the progress in installation of plants for ore crushing and sintering is particularly noted. Changes in furnace design are discussed as well as progress in the development of blower equipment; gas-cleaning practice; and vortex dust catchers. (From review in *Mining and Metallurgy*, v. 29, April 1948.)

27b-26. Master Boiler Makers' Assoc., Official Proceedings of the 1947 Annual Meeting. 325 pages. 1947. The Association, 29 Parkwood St., Albany, N. Y.

Several papers and accompanying discussion presented at Chicago, Sept. 15-18, 1947, as well as miscellaneous committee reports. Deals largely with locomotive boilers, in their metallurgical, design, operation, and maintenance aspects. (Some of the individual papers are being abstracted separately.)

27b-27. 1947 Addenda to A.S.M.E. Boiler Construction Code Material Specifications. 120 pages. 1948. American Society for Mechanical Engineers, 277 Broadway, New York 7, N. Y.

27b-28. Practical Design of Simple Steel Structures. Vol. I. Edition 3. D. S. Steart. Constable and Company, Ltd., 10 Orange Street, London, W.C.2, England. 15s net.

Contents are very much as they were in previous editions, except that the structural tables, formerly published separately as Vol. III have been included in Vol. I. Shop practice and the design of riveted connections and beams. Assumes only a slight knowledge of the theory of structures and none at all of rolled-steel sections or of shop practice. Riveted connections are dealt with in some detail and separate chapters are devoted to simple riveted joints, flange-plate splices, splices for angles, joists and channels, splices for the web plates of

plate girders, and eccentric riveted connections. Design calculations for each of the designs considered. A short chapter on wind pressure and factors of safety is followed by a long one on beam design, and a final chapter on the design of a joist-and-channel crane-gantry girder. (From review in *Engineering,* v. 165, March 19, 1948.)

27b-29. Werkstoff-Handbuch Stahl und Eisen. (Handbook of the Iron and Steel Industry.) 1944. Verlag Stahleisen, m.b.H., Dusseldorf-Possneck, Germany.

A series of brief monographs under five main headings: general: properties and tests; varieties of iron and steel classified according to manufacture and composition; varieties of iron and steel for specific purposes; and steel working and testing. (From review in *Journal of the Iron and Steel Institute,* v. 158, April 1948.)

27b-30. Modern Mechanical Saw Practice. J. R. Foyster, 274 pages. Crosby Lockwood & Son, Ltd., 20 Tudor Street, London, E.C. 4, England. 18s, net.

Latest information on mechanical wood-cutting saws and sawing technique. Chapters cover requirements of saw teeth, their action; comparison tests; use, protection, and adjustment of saws; saw maintenance; the forces operating in sawing such as centrifugal force and the influence of heat; and new methods of using saws. (From review in *Machinery* (London), v. 72, April 15, 1948.)

27b-31. Steel Files, Their Manufacture and Application. Eric N. Simons. Sir Isaac Pitman & Sons, Limited, Parker Street, Kingsway, London, W.C. 2, England. 15s. net.

Historical information, manufacturing, types and cuts of files, and use of files as well as "art of filing". (From review in *Foundry Trade Journal,* v. 84, April 15, 1948.)

27b-32. U.S.S. Carilloy Steels; Alloy Steels for the Special Jobs of Industry. 176 pages, Carnegie-Illinois Steel Corp., Pittsburgh. 1948.

Effects of alloying elements on the microstructure and properties of steel; hardenability; mechanical properties of alloy steels; practical heat treatment; principal applications of constructional alloy steels.

27b-33. Handbuch der Sonderstahlkunde. (Handbook of Special Steels.) Eduard Houdremont. 1036 pages. 1943. Springer Verlag, Berlin, Germany. Reprinted by Edwards Bros., Inc., Ann Arbor, Mich.

Study of carbon and alloyed steels. Crystallographic properties and uses of pure iron. Low, medium, and high-carbon steels, their structures, transformations, and property changes induced by heat treatment and mechanical working. The effects of alloying elements.

27b-34. Schweissen der Eisenwerkstoffe. (Welding of Ferrous Materials.) K. L. Zeyen and W. Lohmann. 456 pages. Verlag Stahleisen, Dusseldorf, Germany.

Metallurgical problems of welding. Correct application of the fundamental laws of metallurgy is essential for successful welding. Destructive and nondestructive tests, and the influence of the microstructure of the different zones of a weld on mechanical properties.

27b-35. Proizvodstbo Kovkogo Chuguna. (Production of Malleable Cast Iron.) Ed. 4. S. S. Nekrytyi. 472 pages. 1945. State Scientific-Technical Publishing House, Moscow, U.S.S.R.

Basic principles of malleable cast iron production. Rapid methods for annealing white cast iron products and the mechanism of their transformation into malleable cast iron. Physical and mechanical properties. Applications of malleable iron products as substitute metal for nonferrous alloys.

27b-36. Copper as an Alloying Element in Steel and Cast Iron. Ed. I. C. H. Lorig and R. R. Adams. 213 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Pertinent information on ferrous materials containing small amounts of copper, as well as recent advances in the metallurgy of copper-bearing iron and steel. Properties, characteristics and applications of cast copper steels, wrought copper steels, copper bearing cast and malleable irons.

27b-37. Sintered Iron and Steel Components. C. J. Leadbeater. 61 pages. 1947. Mapleton House, Brooklyn, N. Y. \$3.50. (Reproduced from PB46386, Office of Technical Services, Washington, D. C.)

Products and work of five German powder-metallurgy plants. Special topics dealt with include sintered-iron driving bands, bullet cores, and sintered-steel products.

27b-38. 1946 British Iron and Steel Yearbook. 329 pages. 1948. Iron and Steel Institute, London. 15s. (\$3.00) plus postage.

For every steel-producing country, statistics on production, imports, and exports; materials consumed in the production of pig iron, steel in-

gots and steel castings. World tables on production of iron ore from 1929 through 1946, pig iron and ferro-alloys for 1866, 1870 and the period 1875-1946, and steel ingots for the same years. Actual output of steel in all countries, with the exception of Russia, during World War II is also included. Russian production since 1941 is estimated.

27b-39. Fabrication of U.S.S. Stainless and Heat Resisting Steels. 133 pages. 1947. United States Steel Co., Chicago, Ill.

A handbook with thumb-indexed sections on welding, riveting, soldering, joint design, machining, cutting, forming, annealing, and finishing. Actual metal samples showing grades of finish.

27b-40. Annual Statistical Report: American Iron and Steel Institute, 1947. 192 pages, 1948. The Institute, 350 5th Ave., New York 1, N. Y.

This 36th Annual Report presents statistics relating to the iron and steel industry of the U. S. and Canada. Comparable figures are given for preceding years as well as for important foreign countries.

27b-41. Aus der Fachsprache des Eisenhuttenmannes. (Iron and Steel Man's Dictionary.) Ed. 2. 106 pages. Verlag Stahleisen, G.m.b.H., Dusseldorf, Germany. 2.75 R.M.

Some 3,000 of the more common words used by iron and steel technicians are given in each section of this German-English, English-German pocket dictionary. Completeness is thus not to be expected, and the compilers seem to have made a judicious and useful selection, from the point of view of the German user. For this reason the English-German section is larger. (From review in *Iron and Steel,* v. 21, Sept. 1948, p. 411-412.)

27b-42. Injury in Ground Surfaces. Ed. 1. L. P. Tarasov. 73 pages. 1947. Norton Co., Worcester 6, Mass.

Types of injury found in the grinding of hard steel, and methods for detecting such defects. Metallurgical and other factors. Suggestions for elimination of surface injury.

27b-43. Sintereisen und Sinterstahl. (Powdered Iron and Powdered Steel). R. Kieffer and W. Hotop. 556 pages. 1948. Springer Verlag, Vienna, Austria. \$16.70 (paper bound); \$17.50, (cloth bound).

A treatise on ferrous powder metallurgy which has benefited substantially from the authors' well-known earlier work on "Pulvermetallurgie und Sinterwerkstoffe." Bibliographically complete up to early 1948. The book is divided into two parts: powders and processes, and uses. The first part deals with methods of powder manufacture, powder properties, test methods, the pressing operation and properties of pressings, sintering and the properties of sintered compacts, double pressing and sintering, hot pressing, and powder-metallurgy equipment generally. Various types of presses, sintering furnaces, and atmosphere generators.

27b-44. Watkins Cyclopedia of the Steel Industry. Ed. 2. 522 pages. 1948. Steel Publications Inc., 108 Smithfield Street, Pittsburgh. \$10.00.

Blast furnaces, coke ovens, rolling mills, pickling, steels, metal finishing and cleaning, heat treating, forging, press-working, sheet and plate fabrication and assembly, welding, steel-processing furnaces, and manufacturing accessories. Statistics of the A.I.S.I. and S.A.E. specifications and various data sheets.

27b-45. Ferrous Materials for the Engineer. R. Fox. 159 pages. Charles Griffin & Co., Ltd., 42 Drury Lane. London, W. C. 2, England. 12s 6d. net.

The general properties of materials and their testing; types of fracture, microscopic examination, and the various testing methods. The heat treatment of steel and the materials available.

27b-46. Principles of Metallography. Ed. 5. Robert S. Williams and Victor O. Homerberg. 319 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. \$4.00.

Purpose is to meet the needs of those students of general science or engineering, and those persons engaged in these fields, who are not specializing in metallography, but whose professional work requires some utilization of the subject. Greater emphasis is laid on applications than on theory. Certain practices brought about by World War II have been incorporated.

27b-47. Common Sense in Steel Treating. W. R. Bennett. 86 pages, 1948. W. R. Bennett, Brattleboro, Vt.

The author writes from the standpoint of the oldtime tool hardener—and of the present-day commercial heat treater. He gets all the hard jobs; seldom are there more than a dozen items of the same kind. A day's work may vary from the hardening of striking dies for fancy flat ware, to the mild treatment of some set screws for a little more strength. This is work for a true artisan. The book, therefore, talks the artisan's language and is full of

good advice on what to do to trick nature. Only when the author attempts to give a scientific explanation does he fall into traps. The reader will do well to heed the practical advice; ignore the attempted theorizing. E.E.T.

27b-48. Prevention of Iron and Steel Corrosion: Processes and Published Specifications. C. Dinsdale. 67 pages. Louis Cassier Co., Ltd., Dorset House, Stamford St., London, S. E. 1, England. 5s. plus postage.

An attempt to compile a complete index of such methods and of standard specifications connected therewith. Methods of preventing corrosion, cleaning metal parts, and codes of practice.

27b-49. The Fracture of Mild Steel Plate. C. F. Elam Tipper. 82 pages. 1948. H. M. Stationery Office, London. (Report No. R.3.) 6s., 6d. Also British Information Services, 30 Rockefeller Plaza, New York 30, N. Y. $2.05.

Causes of brittleness of mild steel in connection with fractures of large welded structures, especially plates of welded ships. Descriptions of fractures in actual ship plate; experiments designed to reproduce similar fractures in the laboratory; development of a notch test and study of the conditions of test as applied to ship plate; metallurgical investigation of the plates; experiments on the effect of notches on ductility and fracture of mild steel; discussion of results; and tables.

27b-50. Estudio de los yacimientos ferriferos de México. Fasc. III. Yacimentos del grupo del Pacifico Norte. Territorio N. de Baja California, Estados de Sonora y Sinaloa. (Study of Iron Deposits in Mexico. Vol. 3. Deposits of the North Pacific Group. Territory of Northern Lower California, States of Sonora and Sinaloa.) Luis Toron Villegas and Adrian Esteve Torres. 309 pages and 101 maps. 1947. Banco de Mexico, Mexico City, Mexico.

Consists of 2 separate books: one, containing illustrations and description of deposits, physical-geological characteristics, geological history, and composition of ores; the other, containing topographical and geological maps of the specific areas investigated. Each individual deposit is studied from standpoint of available amount of ore, quality, exploration facilities, communications.

27c—Nonferrous

27c-1. Nonferrous Melting Practice. American Institute of Mining and Metallurgical Engineers. 29 West 39th St., New York 18, N. Y. $2.25 for members, $3.50 for nonmembers.

Manufacture and fabrication of the principal nonferrous metals. Measurement and Control of Temperatures in Smelting, Refining and Melting Nonferrous Metals, by P. H. Dike and M. J. Bradley; Melting Brass and Bronze in the Foundry, by H. M. St. John; Melting and Alloying of Wrought Copper Alloys, by R. S. Pratt; Melting of Nickel, by W. A. Mudge; Melting and Refining Practices for Magnesium, by Charles E. Nelson; Melting of Aluminum, by T. W. Bossert and H. J. Rowe; Melting of Lead and Tin, by A. J. Phillips. (Part of the Institute of Metals Division Symposium Series.)

27c-2. British Non-Ferrous Metals Research Association; Twenty-Seventh Annual Report. 45 pages. 1947. The Association. Euston Street, London, N. W. 1, England.

General report, review of research progress, researches in progress, reports available, and membership.

27c-3. Developments in Rubber. Andre Rubber Co., Ltd., Kingston By-Pass Surbiton, Surrey, England.

Consists of following series of articles and papers resulting from work done in the laboratories of the publisher, and reprinted from various British journals: Works of the Andre Rubber Company, Ltd.; Bonding of Rubber to Metals, by S. Buchan; Physical Examination of Brass Deposits, by S. Buchan and W. D. Rae; Chemical Nature of the Rubber-to-Brass Bond, by S. Buchan and W. D. Rae; Study of the Rubber-Metal Bond, by S. Buchan and W. D. Rae; Bonded Rubber for Machinery Mountings; Rubber in Electroplating, by S. Buchan; Rubber and the Mining Engineer, by S. Buchan; Testing Methods for Metals-Bonded Rubber, by S. Buchan; Mastication and Rate of Setup, Part II, by S. Buchan; Calculations Relating to the Goodrich Flexometer, by Ralph F. Reynolds; and New Methods of Molding, by S. Buchan. Most of these were previously abstracted when originally published.

27c-4. 1947 Supplement to Book of A.S.T.M. Standards Including Tentatives. Part 1-B. Non-Ferrous Metals. 319 pages. 1947. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

27c-5. The Plating of Zinc Alloy Die Castings. 132 pages. Machinery Publishing Co., Brighton 1, England. 7s 6d.

Various plating methods. Full directions on the composition and maintenance of the various baths used. Methods of testing the adhesion and thickness of the coatings.

Reference to plating literature, a flow sheet showing the sequence of operations, and an index.

27c-6. Copper and Copper Alloy Springs. 62 pages. Copper Development Association, Grand Buildings, Trafalgar Square, London, W. C. 2.

Design, manufacture, and characteristics. 74 ref.

27c-7. Die Edelmetalle und Ihre Legierungen. (The Noble Metals and Their Alloys.) Ernst Raub. 323 pages. 1940. Julius Springer, Berlin, Germany.

Physical and chemical properties and results of cold working of silver, gold, and platinum metals and their alloys. The absorption of gases by noble metals, primarily oxygen, hydrogen, and nitrogen. In the case of the platinum metals, heavy hydrogen is also discussed.

27c-8. Pressure Die Casting. 62 pages. Birmingham Aluminum Casting Co., Ltd., Birmingham, England. 7s, 6d net.

After describing the various systems of pressure die casting—air blown, cold chamber and hot chamber—the handbook discusses the choice of alloys suitable for pressure die casting. Effects of factors such as permanence, surface finishes, effects of temperature, and mechanical strength and consistency. Technique of pressure die casting, giving details of the composition of alloys, mechanical properties, and tolerances and tapers, typical castings. Photographs of pressure die-casting shops. (From review in *Metal Industry,* v. 72, April 9, 1948,)

27c-9. Aluminum Bronze. Revised edition. 169 pages. 1947. Copper Development Association, Grand Building, Trafalgar Sq., London, W.C.2.

Consists of sections on general properties, including structure and transformations; alpha Al bronzes; Al bronzes for hot working; Al bronzes for casting; corrosion resistance; production; fabrication; applications; and Al bronzes for service at elevated temperatures.

27c-10. Copper and Copper Alloys. Owen W. Ellis. 184 pages. 1948. American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. $3.50.

Five lectures presented at 29th annual National Metal Congress and Exposition Oct. 18-24, 1947. Historical development; metallurgy; melting; complex alloys of Cu and Zn; and other alloys of Cu. 109 ref.

27c-11. Century of Silver: 1847-1947. Edition 1. Earl Chapin May. 388 pages. 1947. Robert M. McBride & Company, New York. $3.50.

A comprehensive history of American silverware and of the silversmiths who produced it. How Yankee silversmiths produce beautiful and useful articles first from pewter then from britannia ware, and finally from plated and sterling silver. Full of colorful stories of New England peddlers and salesmen extraordinary, who distributed their articles of silver throughout the Atlantic seaboard by horse and wagon.

27c-12. The Plating of Zinc Alloy Die Castings. 132 pages, 1947. Zinc Alloy Die Casters Association, Lincoln House, Turl Street, Oxford, England.

Modern methods of coating zinc alloy die castings by electrodeposition of nickel, chromium, silver and other metals. Directions on the composition and maintenance of various baths used. Tests and specifications for adhesion and thickness of coatings.

27c-13. Les Radioelements Naturels. (The Natural Radio-Elements.) Irene Joliot-Curie. 191 pages. 1946, Hermann & Cie, 6, Rue de la Sorbonne, Paris, France.

Properties and methods of extraction and purification of the naturally-occurring radio-elements, as well as methods of determination. Methods of radiochemistry and its applications. An outline of our knowledge of artificial radioelements.

27c-14. Quicksilver in Oregon. C. N. Schuette. 172 pages. 1938. Department of Geology and Mineral Industries, State of Oregon, Portland, Oregon. (Bulletin No. 4.)

A survey of deposits with general information on history, geology, mining, metallurgy, and economics of quicksilver.

27c-15. Federal Trade Commission Report on the Copper Industry. Part I. The Copper Industry of the United States and International Copper Cartels. 1947. U. S. Govt. Printing Office, Washington, 25, D. C.

A statistical summary.

27c-16. The Economics of Mining. Ed. 3. Theodore Jesse Hoover. 551 pages. 1948. Stanford University Press, Stanford, Calif.

A survey covering latest economic developments in the mining world and many phases of mining economics with particular attention to valuation, organization, and management of nonferrous metal mines.

27c-17. German Non-Ferrous Foundry Industry. 131 pages. Office of Techni-

cal Services, Dept. of Commerce, Washington. (PB-34011). $3.50.

Practices observed at 18 German firms, particularly in respect to centrifugal casting methods. The coating of steel gear wheels with bronze by a casting process is cited as one of the most important processes developed in German industry.

27c-18. World's Non-Ferrous Smelters and Refineries. Ed. 3. 199 pages. 1948. Quin Press, Ltd., London, England. 17s., 6d.

Present edition is the first to be issued since the war. Contains information relating to over 250 undertakings in 40 countries. Authorized and issued capital, names of directors, description and location of plant, products, capacity, process, brands, descriptions and analyses.

27c-19. Rhenium. J. G. F. Druce. 92 pages. 1948. Cambridge University Press, Cambridge, England, 10s., 6d.

In chapter I the history of the element is recorded; chapter II is devoted to the isolation of the metal and a discussion of its properties. The inorganic compounds of rhenium are described in chapters III to VI, while a few organic derivatives are referred to in chapter VII. Practical applications of rhenium and rhenium compounds, together with relevant patents, are dealt with in the final chapter. A bibliography of rhenium from 1925 to date.

27c-20. Cobalt. Roland S. Young. 190 pages. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. $5.00.

The occurrence, metallurgy, properties, and uses of cobalt. It deals with this substance from the standpoint of the metallurgist, geologist, chemist, soil engineer, physicist, biochemist, and analytical chemist. Recent advances in the fields of cobalt alloys and compounds for high temperature work, magnets, bright nickel plating, catalysts, livestock feeding.

27c-21. Studies in Gold-Platinum Alloys. C. G. Wictorin. 54 pages. 1947. Ivar Hoeggströms, Stockholm, Sweden.

A doctoral dissertation describing and discussing an experimental investigation on the phase diagram, kinetics of precipitation and temperature dependence of electrical resistance. 28 ref.

27c-22. Practical Considerations in Die Casting Design. 246 pages. 1948. New Jersey Zinc Co., 160 Front St., New York 7, N. Y. $3.00.

Specific designs and applications of die castings, of all alloys now in use; and practical considerations involved in design of the products.

27c-23. The Beryllium Industries of Germany and Italy. H. A. Sloman and C. B. Sawyer. 144 pages. Office of Technical Services, Dept. of Commerce, Washington 25, D. C. (PB-2585.)

Progress from 1939 to 1945. Methods for capping aluminum pistons with a layer of beryllium one cm. thick. Use of beryllium in refractory manufacture. Production methods for manufacture of beryllium oxide, beryllium chloride, beryllium metal flakes, and both heavy and light Be alloys.

27c-24. Non-Ferrous Metals and Alloys. Edwin Gregory and Eric N. Simons. 196 pages. 1948. Paul Elek Publishers, Ltd., 37-38 Hatton Gardens, London E.C.1, England. 12s., 6d. net.

General principles of heat treatment, in which grain growth, annealing, induction heating, and reheating cold worked metals are discussed. Properties, heat treatment and hot and cold working of aluminum and its alloys. Copper—including the brasses and bronzes—is followed by nickel and the nickel alloys, monel, "K" monel, and inconel. Magnesium, solders, precious metals, bearing alloys, and Mn-Cu-Ni alloys.

27d—Light Metals

27d-1. Aluminum, From Mine to Sky. June Metcalfe. 128 pages. 1947. Whittlesey House, McGraw-Hill Book Co., 330 W. 42nd St., New York. $2.50.

Summary of the metal "from mine to finished product" in elementary language.

27d-2. Production of Metallurgical Alumina From Pennsylvania Nodular Diaspore Clays. J. E. Conley, R. A. Brown, F. J. Cservenyak, R. C. Anderberg, H. J. Kandiner, and S. J. Green. 193 pages. 1947. U. S. Government Printing Office, Washington. (Bureau of Mines Bulletin 465.)

Details of an extensive laboratory and pilot-plant investigation of all the factors involved in the above, including economics of the process. The principal step of the method studied comprises sintering with limestone and soda ash to convert the alumina to a water-soluble form and the silica to compounds insoluble in water or dilute alkalies. Other steps in the proposed flow sheet are: grinding, extraction, carbonation, and calcining. Results show that 87 to 90% of the Al_2O_3 can be recovered in a quality suitable for electrolysis. 73 ref.

27d-3. Magnesium Alloy Handbook. F. A. Hughes. 224 pages. Magnesium

Elektron, Ltd., Abbey House, Baker St., London, N. W. 1, England. 25s.

Specifications and properties, methods of fabrication, applications, and other information on magnesium alloys. A section deals with the comparatively new zirconium-containing, alloys of high proof stress ratio.

27d-4. Aluminum and Its Alloys. N. F. Budgen. Ed. 2. 363 pages. 1933. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W. C. 2. England. 25s.

Original purpose of this book—presentation of a popular description of the subject for the semi-technical reader—has been maintained. The subdivisions are presented in a natural order—occurrence, production, properties, heat treatment, melting and alloying, casting, fabrication, working, welding, corrosion surface treatment, and industrial applications. Includes 150 illustrations, several tables, an inset map of Europe showing the location of the principal reduction works in 1940, and references following each chapter.

27d-5. Alcoa Aluminum and Its Alloys. 154 pages. 1947. Aluminum Company of America, Pittsburgh.

Chemical and physical properties, heat treatment, products, castings, fabricating practices, and tables of data.

27d-6. Aluminum and Its Applications. Hiram Brown and Others. 338 pages. 1948. Pitman Publishing Corporation, 2 W. 45th St., New York. $5.75.

Applications are demonstrated in standing authorities in the fields of individual chapters written by outaircraft assemblies, aircraft engines, aircraft castings, automotive manufacture, railroads, marine assemblies, electrical appliances and equipment, and the chemical industries. The major alloys and fabricating methods with each step. Leading manufacturers and fabricators are represented by contributions or discussions.

27d-7. Welding and Brazing Alcoa Aluminum. 128 pages. 1947. Aluminum Company of America, Pittsburgh, Pa.

A manual.

27d-8. Aluminum and Its Alloys. Edition 2. N. F. Budgen. 369 pages. 1947. Pitman Publishing Corp., 2 W. 45th St., New York City, N. Y.

Various branches of metallurgical work related to and comprising the aluminum industry. Properties, processes and methods employed in their manufacture and their applications in modern engineering.

27d-9. Technologie der Leichtmetalle. (The Technology of Light Metals.) A. von Zeerleder. 364 pages. Rascher Verlag, Zurich, Switzerland. 45s net.

Book deals only very briefly with the history and the methods of production of aluminum and magnesium. Practical rather than theoretical issues predominate in the discussion of commercial light alloys. Properties and mechanical testing; corrosion resistance and analysis; design; impact extrusion; drawing; production of hollow parts by spinning, beating, and deep drawing; heat treatment; machining; soldering and welding; riveting; surface treatment; choice of light alloys; applications; and storage. (From review in *Metal Industry,* v. 72, April 9, 1948.)

27d-10. Werkstoff Aluminum und seine anodische Oxidation. (Aluminum as a Material and Its Anodic Oxidation.) M. Schenk. 1042 pages. 1948, A. Francke, A. G. Berne, Switzerland. 138 Swiss francs.

The author has made notable contributions to research on anodizing and has first-hand knowledge of many of the fabricating processes used in the aluminum industry. The nature of aluminum alloys and the various preliminary or following treatments, such as heat treating or joining, which affect the anodizing process. Chemical and electrochemical behavior of aluminum, and the corrosion problems. Anodizing itself, with emphasis on the oxalic acid process. Costs, the patent literature, control and test methods, and choice of material.

27d-11. Analytical Methods for Aluminum Alloys. Carl H. Burton. 103 pages. Aluminum Research Institute, 111 West Washington St., Chicago 2, Ill. $1.00.

Chemical, photometric, and spectrographic methods for the quantitative determination of all elements commonly found in aluminum alloys. Methods for sampling ingots. The book is the result of 17 years of cooperative work in the laboratories of the members of A.R.I.

27d-12. Le polissage électrolytique des surfaces métalliques et ses applications. Tome I. aluminum magnésium, alliages légers. (Electrolytic Polishing of Metallic Surfaces and Its Applications. Vol. 1. Aluminum, Magnesium, and Light Alloys.) P. A. Jacquet. 359 pages. 1948. Editions Metaux, 32, Rue du Marechal Joffre, Saint-Germain-en-Laye (S. & O.), France. 3600 francs.

The method, its applications to the physicochemical and micro-

graphic study of metals, and to commercial processes. The book will be of value to the metallurgist and physicist in the study of surfaces outside of field indicated by the title. 196 ref.

27d-14. Aluminum and Aluminum Alloys in the Food Industry. J. M. Bryan. 154 pages. Department of Scientific & Industrial Research, Park House, 24 Rutland Gate, London, S.W.7, England; or His Majesty's Stationery Office, York House, Kingsway, London, W.C.2, England. 3s. 4d.

Comprehensive data on properties of aluminum and its alloys which might conceivably affect their utility in the handling and processing of foods.

27d-15. Casting Alcoa Alloys. 141 pages. 1948. Aluminum Company of America, 2140 Gulf Bldg., Pittsburgh, Pa.

Aluminum ingot products, material choice, casting alloys, foundry practice, foundry principles, and heat treatment.

27d-16. Machining Alcoa Aluminum and Its Alloys. 66 pages. 1948. Aluminum Company of America, 2140 Gulf Bldg., Pittsburgh, Pa.

Desirable characteristics in tools for machining aluminum and its alloys; speeds, feeds, and depths of cuts which will operate these tools satisfactorily; where common practice as well as tools of standard design may be used; and where the use of special practices or tools will produce better results.

27d-17. Aluminium: Fabricage, Verwerking en Toepassings-Mogeliukheden. (Aluminum: Its Production, Fabrication, and Applications.) J. K. Van de Loo. 127 pages. 1948. Vitgevers Mij. Diligentia, Amsterdam, The Netherlands.

A concise survey of the production, properties, fabrication, and applications of Al and Al alloys. Recovery from bauxite, casting, forming, joining, machining, surface treatment.

27d-18. Anodic Oxidation of Aluminium and Its Alloys. 64 pages. Aluminium Development Association, 33, Grosvenor St., London, W. 1, England. 1s.

The procedure common to all processes and methods involving chromic, sulphuric, and oxalic acids. Dyeing procedure.

27d-19. Designing for Alcoa Die Castings. 188 pages, 1948. Aluminum Company of America, Gulf Bldg., Pittsburgh 19, Pa. $1.00.

After several chapters presenting fundamentals of die-casting machines, dies and alloys, a comprehensive 80-page section deals with various phases of casting design. The final sections are devoted to machining, finishing, inspecting, Alcoa facilities, and a glossary of diecasting terms.

27d-20. The Aluminum Cartel. Louis Marlio. 130 pages. 1947. The Brookings Institution, 722 Jackson Place, N. W., Washington 6, D. C. $1.50.

A case study of one of the most important international cartels in the industrial field. Problems and policies relevant to all types of cartel organizations. History of numerous cartel agreements from 1901-1939.

27d-21. Werkstoff Aluminium und Seine anodische Oxydation. (Aluminum and Its Anodic Oxidation.) Max Schenk. 1042 pages. 1948. A. Francke, AG, Berne, Switzerland.

A comprehensive handbook on aluminium and its alloys with special emphasis on the process of anodizing and properties of anodized aluminum articles. Historical survey; metallography and properties of Al and its alloys; methods of joining and heat treating; chemical and electrochemical behavior; corrosion resistance; surface treatments; and testing methods. Anodizing patents.

27d-22. Aluminum Alloys and Mill Products. 162 pages, 1948. Reynolds Metals Co., 2500 So. Third St., Louisville, Ky. $1.

A data book on aluminum alloys covering alloy designation systems, tempers, sizes, shapes, physical properties, chemical properties, mechanical properties and fabricating characteristics. Wrought aluminum mill products and methods of producing them. Casting alloys, and pig and ingot products.

ADDRESSES OF PUBLICATIONS

I. English Language Journals

A

Aero Digest, 515 Madison Ave., New York 22, N. Y.

Aeronautical Engineering Review, 2 East 64th St., New York 21, N. Y.

Aeroplane, Bowling Green Lane, London, E.C.1, England.

Agricultural Engineering Record, N.I.A.E., Silsoe, Bedfordshire, England.

Aircraft Engineering, 12, Bloomsbury Square, London, W.C.1, England.

Aircraft Production, Stamford St., London, S.E.1, England.

Alloy Casting Bulletin, 39 Broadway, New York, N. Y.

Alloy Metals Review, Ditton Road, Widnes, Lancashire, England.

Aluminum Bulletin, 420 Lexington Ave., New York 17, N. Y.

Aluminium and the Non-Ferrous Review, 25, High St., Merton,. S.W.19, England.

American Ceramic Society Bulletin, 2525 North High St., Columbus 2, Ohio.

American Ceramic Society, Journal, 2525 North High St., Columbus 2, Ohio.

American Chemical Society, Journal, 1155 16th St., N.W., Washington 6, D.C.

American Concrete Instutite, Journal, New Center Bldg., Detroit 2, Mich.

American Concrete Institute, Proceedings, New Center Bldg., Detroit 2, Mich.

American Electroplaters Society, Proceedings, Box 168, Jenkintown, Pa.

American Foundryman, 222 West Adams St., Chicago 6, Ill.

American Foundrymen's Association, Transactions, Room 1198, 222 West Adams St., Chicago 6, Ill.

American Gas Association Monthly, 420 Lexington Ave., New York 17, N. Y.

American Gas Journal, 53 Park Place, New York 7, N. Y.

American Machinist, 330 West 42nd St., New York 18, N.Y.

American Mineralogist, Mineralogical Laboratory, University of Michigan, Ann Arbor, Mich.

American Oil Chemists' Society, Journal, 35 East Wacker Drive, Chicago 1, Ill.

American Paint Journal, 3713 Washington Ave., St., Louis 8, Mo.

American Petroleum Institute, Proceedings, 50 West 50th St., New York 20, N.Y.

American Railway Engineering Association, Bulletin, 59 East Van Buren St., Chicago 5, Ill.

American Rocket Society, Journal, Engineering Bldg., 29 West 39th St., New York 18, N. Y.

American Society for Metals, Transactions, 7301 Euclid Ave., Cleveland 3, Ohio.

American Society for Testing Materials, Bulletin (See ASTM Bulletin).

American Society of Mechanical Engineers, Transactions, 29 West 39th St., New York 18, N. Y.

American Society of Naval Engineers, Journal, Navy Bldg., Constitution Ave., 16th to 17th Sts., N.W., Washington, D. C.

American Waterworks Association, Journal, 500 5th Ave., New York 18, N. Y.

American Welding Society, Journal (See Welding Journal).

American Zinc Institute, Journal, 60 East 42nd St., New York 17, N. Y.

Analyst, 7-8, Idol Lane, London, E.C.3, England.

Analytical Chemistry, 1155 Sixteenth St., N.W., Washington 6, D. C.

Annual Reports on the Progress of Chemistry, The Chemical Society, Burlington House, London, W.1, England.

Applied Hydraulics, 1240 Ontario St., Cleveland 13, Ohio.
Architectural Forum, 540 North Michigan Ave., Chicago 11, Ill.
Architectural Record, 119 West 40th St., New York, N. Y.
Asbestos, 17th Floor Inquirer Bldg., Philadelphia 30, Pa.
ASTM Bulletin, 1916 Race St., Philadelphia 3, Pa.
ATI Technical Data Digest (See Technical Data Digest).
Audio Engineering, 342 Madison Ave., New York 17, N. Y.
Automobile Engineer, Dorset House, Stamford St., London, S.E.1, England.
Automotive Industries, Chestnut and 56th St., Philadelphia 39, Pa.
Aviation Week, 330 West 42nd St., New York 18, N. Y.

B

Bearing Engineer, The Torrington Co., Bearings Division, Torrington, Conn.
Bell Laboratories Record, 463 West St., New York 14, N. Y.
Better Enameling, 1427 South 55th Court, Cicero 50, Ill.
B.H.P. Review, Broken Hill Proprietary Co., Ltd., 265 Franklin St., Melbourne, Australia.
Birmingham Metallurgical Society, Journal, 253, Longbridge Lane, Northfield, Birmingham, 31, England.
Blast Furnace and Steel Plant, 108 Smithfield St., Pittsburgh 30, Pa.
Bookbinding and Book Production, 50 Union Square, New York 3, N. Y.
Brick and Clay Record, 5 South Wabash Ave., Chicago 3, Ill.
British Ceramic Society Transactions, The North Staffordshire Technical College, Stoke-on-Trent, England.
British Chemical Digest Ltd., 14, The Avenue, Beckenham, Kent, England.
British Coal Utilization Research Association, Monthly Bulletin, 13, Grosvenor Gardens, London, S.W.1, England.
British Printer, 2, 3, and 4 Cockspur St., London, S.W.1, England.
British Science News, 3, Hanover St., London, W.1, England.
British Steelmaker, 7, Chesterfield Gardens, Curzon St., London, W.1, England.
Brown Boveri Review, Baden, Switzerland.
Brush and Spray, P.O. Box 3428, Terminal Annex, Los Angeles 54, Calif.
B.S.F.A. Bulletin, British Steel Founders Assn., 301, Glossop Rd., Sheffield, 10, England.
Bulletin of the Atomic Scientists, 1126 East 59th St., Chicago 37, Ill.
Bulletin of the Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London, E.C.2, England.
Business Week, 330 West 42nd St., New York 18, N. Y.

C

Canadian Chemistry and Process Industries, 137 Wellington St., West, Toronto 1, Ont., Canada.
Canadian Institute of Mining and Metallurgy, Transactions (See Canadian Mining and Metallurgical Bulletin).
Canadian Journal of Research, National Research Council of Canada, Ottawa, Canada.
Canadian Metals & Metallurgical Industries, 137 Wellington St., West, Toronto, 1, Ont., Canada.
Canadian Mining Journal, Gardenvale, Quebec.
Canadian Mining and Metallurgical Bulletin, 811 Drummond Bldg., Montreal, Quebec, Canada.
Cast Iron Pipe News, Peoples Gas Bldg., Chicago 3, Ill.
Ceramic Industry, 5 South Wabash Ave., Chicago 3, Ill.
Chemical Age, 154 Fleet St., London, E.C.4, England.
Chemical and Engineering News, 1155 16th St., N.W., Washington, D. C.
Chemical Engineering, 330 West 42nd St., New York 18, N. Y.
Chemical Industries, 522 Fifth Ave., New York 18, N. Y.
Chemical, Metallurgical, and Mining Society of South Africa, Journal, P.O. Box 1183, Johannesburg, South Africa.
Chemical Reviews, Williams & Wilkins Co., Mt. Royal and Guilford Ave., Baltimore 2, Md.
Chemist Analyst, J. T. Baker Chemical Co., Phillipsburg, N. J.
Chemistry & Industry, 56 Victoria St., London, S.W.1, England.
Civil Engineering, 33 West 39th St., New York 18, N. Y.
Coal Age, 210 South DesPlaines St., Chicago 6, Ill.

Coke and Gas, 33 Tothill St., Westminster, London, S.W.1, England.
Colliery Guardian, 30-31 Furnival St., Holburn, London, E.C.4, England.
Colorado School of Mines, Quarterly, Golden, Colorado.
Compressed Air Magazine, Phillipsburg, N. J.
Combustion, 200 Madison Ave., New York 16, N. Y.
Copper and Brass Bulletin, 420 Lexington Ave., New York 17, N. Y.
Corrosion, Southern Standard Bldg., 711 Main St., Houston 2, Texas.
Corrosion and Material Protection, 1131 Wolfendale St., Pittsburgh 12,

D

Deco Trefoil, Denver Equipment Co., P. O. Box 5268, Denver 17, Colo.
Die Castings, 1240 Ontario St., Cleveland 13, Ohio.
Drilling, 1420 Pacific Ave., Dallas, Texas.
Drilling Contractor, 1412 Gulf States Bldg., Dallas 1, Texas.
Du Pont Magazine, E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.

E

Economic Geology and Bulletin of the Society of Economic Geologists, Urbana, Ill.
Edgar Allen News, Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield 9, England.
Edison Electric Institute Bulletin, 56th and Chestnut Sts., Philadelphia 39, Pa.
Electric Light & Power, 360 North Michigan Ave., Chicago, Ill.
Electrical Engineering, 33 West 39th St., New York 18, N. Y.
Electrical Manufacturing, 1250 Sixth Ave., New York 20, N. Y.
Electrochemical Society, Journal, 27 Islington, London, N.1, England.
Electrodepositors' Technical Society, Journal, 27 Islington, London, N.1, England.
Electronic Engineering, 28 Essex St., Strand, London, W.C.2, England.
Electronic Industries & Electronic Instrumentation, 480 Lexington Ave., New York 17, N. Y.
Electronics, 330 West 42nd St., New York 18, N. Y.
Electroplating (See Electroplating and Metal Finishing).
Electroplating and Metal Finishing, 83 Udney Park Rd., Teddington, England.
Electrotypers & Stereotypers Journal, 329 High Holborn, London, W.C.1, England.
Enamelist, 4150 East 56th St., Cleveland 5, Ohio.
Endeavour, Nobel House, Buckingham Gate, London, S.W.1, England.
Engineer, 28 Essex St., Strand, London, W.C.2, England.
Engineering, 35-36 Bedford St., Strand, London, W.C.2, England.
Engineering and Mining Journal, 330 West 42nd St., New York 18, N. Y.
Engineering Experiment Station News (See Ohio State University, Engineering Experiment Station News).
Engineering Materials and Processes, 38 Hatton Gardens, London, E.C.1, England.
Engineering News-Record, 330 West 42nd St., New York 18, N. Y.
Engineers' Digest (American Edition), 1 Madison Ave., New York 10, N. Y.
Esso Oilways, 15 West 51st St., New York 19, N. Y.

F

Factory Management and Maintenance, 330 West 42nd St., New York 18, N. Y.
Faraday Society, Transactions, 98 Great Russell St., London, England.
Fasteners, 1550 Hanna Bldg., Cleveland 15, Ohio.
Finish, 360 North Michigan Ave., Chicago 1, Ill.
Flow, 1240 Ontario St., Cleveland 13, Ohio.
Food Industries, 99-120 North Broadway, Albany 1, N. Y.
Foote Prints, 500 Germantown Trust Co. Bldg., Philadelphia 44, Pa.
Fortune, 160 Maple St., Jersey City 3, N. J.
Foundry, Penton Bldg., Cleveland 13, Ohio.
Foundry Trade Journal, 49 Wellington St., Strand, London, W.C.2, England.
Franklin Institute, Journal, Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa.
Frontier, Armour Research Foundation Technology Center, Chicago 16, Ill.
Fuel (Formerly Fuel in Science and Practice), 4, 5, 6 Bell Yard, Temple Bar, London, W.C.2, England.

G

Gas Age, Moore-Robbins Publishing Co., 8 Harmony Place, Brattleboro, Vt.

Gas Journal, 11 Bolt Court, Fleet St., London, E.C.4, England.

Gas Times, 29 Grove Rd., Leighton Buzzard, Beds., England.

G. E. Welding Arcs, General Electric Co., Schenectady 5, N. Y.

General Electric Review, Schenectady 5, N. Y.

Grits and Grinds, Norton Co., Worcester 6, Mass.

H

Heating and Ventilating, 148 Lafayette St., New York 13, N. Y.

Heating, Piping & Air Conditioning, 6 North Michigan Ave., Chicago 2,

I

Inco Magazine, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

India Society of Engineers, Journal, 7 Netaji Subkas Rd., Calcutta, India.

Industrial Chemist and Chemical Manufacturer, 33 Tothill St., Westminster, London, S.W.1, England.

Industrial Diamond Review, 226 Latymer Court, Hammersmith, London, W.6, England.

Industrial and Engineering Chemistry, 1155 16th St., N.W., Washington 6, D. C.

Industrial Finishing, 1142 North Meridian St., Indianapolis 4, Ind.

Industrial Gas, 9 East 38th St., New York 16, N. Y.

Industrial Heating, Union Trust Bldg., Pittsburgh 19, Pa.

Industry and Power, St. Joseph, Mich.

Industry and Welding, 1240 Ontario St., Cleveland 13, Ohio.

Inland Printer, 309 West Jackson Blvd., Chicago 6, Ill.

Institute of British Foundrymen, Proceedings, St. John St. Chambers, Deansgate, Manchester 3, England.

Institute of Metals, Journal, 4 Grosvenor Gardens, London, S.W.1, England.

Institute of Petroleum, Journal, The Institute, 26 Portland Place, London, W.1, England.

Institute of Petroleum, Review. The Institute, 26 Portland Place, London, W.1, England.

Institute of Radio Engineers, Proceedings, 1 East 79th St., New York 21, N. Y.

Institute Spokesman, National Lubricating Grease Institute, 4638 Millcreek Parkway, Kansas City 2, Mo.

Institute of Welding, Transactions, 2 Buckingham Palace Gardens, London, S.W.1, England.

Institution of Mechanical Engineers, Proceedings, Elmbank Crescent, Glasgow, Scotland; Storey's Gate, St. James Park, London, S.W.1, England.

Institution of Mining and Metallurgy, Bulletin, Salisbury House, Finsbury Circus, London, E.C.2, England.

Instrumentation, Wayne and Roberts Ave., Philadelphia 44, Pa.

Instruments, 1117 Wolfendale St., Pittsburgh 12, Pa.

Iron Age, 100 East 42nd St., New York 17, N. Y.

Iron and Steel, Dorset House, Stamford St., London, S.E.1, England.

Iron and Steel Engineer, 1010 Empire Bldg., Pittsburgh 22, Pa.

Iron and Steel Institute, Journal, 4 Grosvenor Gardens, London, S.W.1, England.

J

Journal of the Aeronautical Sciences, 2 East 64th St., New York 21, N. Y.

Journal of the American Ceramic Society, 2525 North High St., Columbus 2, Ohio.

Journal of the American Chemical Society, 1155 16th St., N.W., Washington 6, D. C.

Journal of the American Concrete Institute, New Center Bldg., Detroit 2, Mich.

Journal of the American Oil Chemists' Society, 35 East Wacker Dr., Chicago 1, Ill.

Journal of the American Rocket Society, Engineering Bldg., 29 West 39th St., New York 18, N. Y.

Journal of the American Society of Naval Engineers, Navy Bldg., Constitution Ave., 16 to 17th Streets, N.W., Washington, D. C.

Journal of the American Waterworks Association, 500 5th Ave., New York 18, N. Y.

Journal of the American Welding Society (See Welding Journal).

Journal of the American Zinc Institute, 60 East 42nd St., New York 17, N, Y.

Journal of Applied Mechanics, 29 West 39th St., New York 18, N. Y.

Journal of Applied Physics, 57 East 55th St., New York 22, N. Y.

Journal of the Birmingham Metallurgical Society, 253, Longbridge Lane, Northfield, Birmingham, 31, England.

Journal of Chemical Education, 20th and Northampton Sts., Easton, Pa.

Journal of the Chemical, Metallurgical, and Mining Society of South Africa, P. O. Box 1183, Johannesburg, South Africa.

Journal of Chemical Physics, 57 East 55th St., New York 22, N. Y.

Journal of Colloid Science, 125 East 23rd St., New York 10, N. Y.

Journal of the Electrochemical Society, 27 Islington, London, N.1, England.

Journal of the Electrodepositors' Technical Society, 27 Islington, London, N.1, England.

Journal of Engineering Education, Prince and Lemon Sts., Lancaster, Pa.

Journal of the Franklin Institute, Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa.

Journal of the India Society of Engineers, 7 Netaji Subkas Rd., Calcutta, India.

Journal of the Institute of Metals, 4, Grosvenor Gardens, London, S.W.1, England.

Journal of the Institute of Petroleum, The Institute, 26 Portland Place, London, W.1, England.

Journal of the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1, England.

Journal of the Oil and Colour Chemists Association, J. Hannaford, F.C.A., Aldwych House, Aldwych, W.C.2, England.

Journal of the Optical Society of America, 57 East 55th St., New York 22, N. Y.

Journal of Physical and Colloid Chemistry, Williams & Wilkins Co., Mt. Royal and Guilford Ave., Baltimore 2, Md.

Journal of Research of the National Bureau of Standards, U. S. Government Printing Office, Washington 25, D. C.

Journal of Scientific and Industrial Research, "P" Block, Raisina Rd., New Delhi, India.

Journal of Scientific Instruments and of Physics in Industry, 47 Belgrave Square, London, S.W.1, England.

Journal of the Society of Chemical Industry, 56 Victoria St., London, S.W.1, England.

Journal of the Society of Glass Technology, Northumberland Rd., Sheffield, 10, England.

Journal of the West of Scotland Iron and Steel Institute, The Institute, 39 Elmbank Crescent, Glasgow, Scotland.

L

Light Metal Age, 201 North Wells St., Chicago 6, Ill.

Light Metals, Bowling Green Lane, London, E.C.1, England.

Linde Tips, Linde Air Products Co., 30 East 42nd St., New York 17, N.Y.

Lubrication, 135 East 42nd St., New York 17, N. Y.

Lubrication Engineering, 343 South Dearborn St., Chicago 4, Ill.

M

Machine Design, Penton Bldg., Cleveland 13, Ohio.

Machine and Tool Blue Book, 542 South Dearborn St., Chicago 5, Ill.

Machinery (American), 148 Lafayette St., New York 13, N. Y.

Machinery (London), National House, West St., Brighton, 1, England.

Machinery Lloyd (Overseas Edition), 6, Cavendish Place, Regent St., London, W. 1, England.

Magazine of Magnesium, Brooks & Perkins, Inc., 2457 Woodward Ave., Detroit, 1, Mich.

Magnesium Review and Abstracts, Magnesium Elektron Ltd., Abbey House, London, N.W.1, England.

Mainspring, Associated Spring Corp., Bristol, Conn.

Materials & Methods, 330 West 42nd St., New York 18, N. Y.

Mechanical Engineering, 29 West 39th St., New York 18, N. Y.

Mechanization, Munsey Bldg., Washington 4, D. C.

Metal Bulletin, 39 Jermyn St., London, S.W.1, England.

Metal Finishing, 11 West 42nd St., New York 18, N. Y.

Metal Industry, Dorset House, Stamford St., London, S.E.1, England.
Metal Powder News, 420 Lexington Ave., New York 17, N. Y.
Metal Powder Report, Commonwealth House, 1-19 New Oxford St., London, W.C.1, England.
Metal Progress, 7301 Euclid Ave., Cleveland 3, Ohio.
Metal Treatment (See Metal Treatment and Drop Forging).
Metal Treatment and Drop Forging, 49 Wellington St., Strand, London, W.C.2, England.
Metallurgia, 31 King St. West, Manchester 3, England.
Metals, 425 West 25th St., New York 1, N. Y.
Metals Review, 7301 Euclid Ave., Cleveland 3, Ohio.
Metals Technology, 29 West 39th St., New York 18, N. Y.
Microtecnic (English-French), Editions Scriptar S. A., 23 Avenue de la Gare, Lausanne, Switzerland. (U. S. Agent, 66 Beaver St., New York 4, N. Y.)
Mine & Quarry Engineering, 23 Great Queen St., London, W.C.2, England.
Mines Magazine, 734 Cooper Bldg., Denver 2, Colo.
Mining and Metallurgical Society of America, Bulletin, 11 Broadway, New York 4, N. Y.
Mining and Metallurgy, 29 West 39th St., New York 18, N. Y.
Mining Congress Journal, 1102 Ring Bldg., Washington 6, D. C.
Mining World, 121 2nd St., San Francisco 5, Calif.
Mining Technology, 29 West 39th St., New York 18, N. Y.
Modern Industrial Press, Windsor Manor, P. O. Box 687, Pittsburgh 30, Pa.
Modern Industry, 347 Madison Ave., New York 17, N. Y.
Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio.
Modern Metals, 206 South Michigan Ave., Chicago 4, Ill.
Modern Packaging, 122 East 42nd St., New York 17, N. Y.
Modern Plastics, 122 East 42nd St., New York 17, N. Y.

N

National Bureau of Standards, Journal of Research (See Journal of Research of the National Bureau of Standards).
National Bureau of Standards, Technical News Bulletin, U. S. Government Printing Office, Washington 25, D. C.
National Lithographer, 11 Park Place, New York 7, N. Y.
Nature, St. Martin's St., London, W.C.2, England.
Nickel Bulletin, Grosvenor House, Park Lane, London, W.1, England.
Nickel Topics, International Nickel Co. 67 Wall St., New York 5, N. Y.
Non-Destructive Testing, 53 West Jackson Blvd., Chicago 4, Ill.
Nucleonics, 330 West 42nd St., New York 18, N. Y.

O

Offical Digest, 704 Weightman Bldg., 1524 Chestnut St., Philadelphia, Pa.
Ohio State University, Engineering Experiment Station News, Columbus, Ohio.
Oil and Colour Chemists' Association, Journal, J. Hannaford, F.C.A., Aldwych House, Aldwych, W.C.2, England.
Oil and Gas Journal, 211 S. Cheyenne Ave., Tulsa 1, Okla.
Operating Engineer, 330 West 42nd St., New York 18, N. Y.
Optical Society of America, Journal, 57 East 55th St., New York 22, N.Y.
Organic Finishing, 11 West 42nd St., New York 18, N. Y.

P

Paint and Varnish Production Manager, Mills Bldg., Washington 6, D.C.
Paint Manufacture, Leonard Hill Ltd., 17 Stratford Place, London, W.1, England.
Paint, Oil and Chemical Review, 537 South Dearborn St., Chicago 5, Ill.
Paint Progress, New Jersey Zinc Co., 160 Front St., New York 7, N. Y.
Paint Technology, 5 Grange Court, Pinner, Middlesex, England.
Paper Trade Journal, 15 West 47th St., New York 19, N. Y.
Petroleum, Leonard Hill, Ltd., 17, Stratford Place, London, W.1, England.
Petroleum Engineer, Irwin-Keasler Bldg., Dallas 1, Texas.
Petroleum Processing, 1213 West 3rd St., Cleveland 13, Ohio.

Petroleum Refiner, Gulf Publishing Co., Box 2608, Houston 1, Texas.

Philips Research Reports, 215 4th Ave., New York 3, N. Y.

Philosophical Magazine, Taylor and Francis Ltd., Red Lion Court, Fleet St., London, E.C.4, England.

Photo-Engravers' Bulletin, 166 West Van Buren St., Chicago 4, Ill.

Photographic Journal, Royal Photographic Society of Great Britain, 16 Princes Gate, London, S.W.7, England.

Physica (mostly English), Martinus Nijhoff, The Hague, Netherlands.

Physical Review, 57 East 55th St., New York 22, N. Y.

Physical Society, Proceedings, 1, Lowther Gardens, Prince Consort Rd., London, S.W.7, England.

Physics Today, 57 East 55th St., New York 22, N. Y.

Pig Iron Rough Notes, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.

Plastics (London), Bowling Green Lane, London, E.C.1, England.

Plating, 5800 North Mervine St., Philadelphia 41, Pa.

Powder Metallurgy Bulletin, 320 Yonkers Ave., Yonkers 2, N. Y.

Power, 99-129 Broadway, Albany 1, N. Y.

Power Generation (Formerly Power Plant Engineering), 53 West Jackson Blvd., Chicago 4, Ill.

Printing Equipment Engineer, 1276 West 3rd St., Cleveland 13, Ohio.

Printing Magazine, 41 Park Row, New York 7, N. Y.

Proceedings of the American Concrete Institute, New Center Bldg., Detroit 2, Mich.

Proceedings of the American Electroplaters Society, Box 168, Jenkintown, Pa.

Proceedings of the American Petroleum Institute, 50 West 50th St., New York 20, N. Y.

Proceedings of the Institute of British Foundrymen, St. John St. Chambers, Deansgate, Manchester 3, England.

Proceedings of the I.R.E. (See Institute of Radio Engineers, Proceedings).

Proceedings of the Institution of Mechanical Engineers, Elmbank Crescent, Glasgow, Scotland; Storey's Gate, St. James Park, London, S.W.1, England.

Proceedings of the Physical Society, 1, Lowther Gardens, Prince Consort Rd., London, S.W.7, England.

Proceedings of the Royal Society, Bentley House, N.W.1, London, England.

Proceedings of the Society for Experimental Stress Analysis, Central Square Station, P. O. Box 168, Cambridge 39, Mass.

Product Engineering, 330 West 42nd St., New York 18, N. Y.

Production Engineering & Management, 2842 West Grand Blvd., Detroit 2, Mich.

Products Finishing, 431 Main St., Cincinnati 2, Ohio.

Progressive Architecture, 330 West 42nd St., New York 18, N. Y.

PSA Journal, 374 Broadway, Albany 7, N. Y.

Q

Quarterly of Applied Mathematics, 458 Ahnaip St., Manasha, Wis.

Quarterly of the Colorado School of Mines, Golden, Colo.

Quarterly Journal of Mechanics and Applied Mathematics, Oxford University Press, Amen House, London, E. C. 4, England.

R

Radio-Electronic Engineering (Bound with Radio & Television News—formerly Radio News), 185 North Wabash Ave., Chicago 1, Ill.

Railway Age, 30 Church St., New York 7, N. Y.

Railway Engineering and Maintenance, 105 West Adams St., Chicago 3, Ill.

Railway Mechanical Engineer, 30 Church St., New York 7, N. Y.

Record of Chemical Progress, Wayne University, Detroit 1, Mich.

Refractories Journal, 7, Chesterfield Gardens, Curzon St., London, W.1, England.

Refrigerating Engineering, 40 West 40th St., New York 18, N. Y.

Reports of the Progress of Applied Chemistry, 56, Victoria St., London, S.W.1, England.

Research, 4, 5, 6 Bell Yard, Temple Bar, London, W.C.2, England.

Review of Scientific Instruments, 57 East 55th St., New York 22, N. Y.

Reviews of Modern Physics, 57 East 55th St., New York 22, N. Y.

Reynolds Metals Technical Advisor, 2500 South 3rd St., Louisville 1, Ky.
Rohm & Haas Reporter, Washington Square, Philadelphia 5, Pa.
Roofing, Siding and Insulation (Formerly Insulation), 45 West 45th St., New York 19, N. Y.
Royal Society, Proceedings, Bentley House, London, N.W.1, England.
Rubber Age, 250 West 57th St., New York 19, N. Y.

S

SAE Journal, 29 West 39th St., New York 18, N. Y.
SAE Quarterly Transactions, 29 West 39th St., New York 18, N. Y.
Science, 1515 Massachusetts Ave., N. W., Washington 5, D. C.
Science News Letter, 1719 North St., N.W., Washington 6, D. C.
Science Progress, 41 Maddox St., London, W.1, England.
Scientific American, 24 West 40th St., New York 18, N. Y.
Scientific Monthly, 1515 Massachusetts Ave., N.W., Washington 5, D. C.
Screw Machine Engineering, 45 Exchange St., Rochester 4, N. Y.
Sheet Metal Industries, 49 Wellington St., London, W.C.2, England.
Sheet Metal Worker, 1309 Noble St., Philadelphia 23, Pa.
Skillings' Mining Review, 810 Fidelity Bldg., Duluth 2, Minn.
Society of Automotive Engineers, Journal (See SAE Journal).
Society of Automotive Engineers, Quarterly Transactions (See SAE Quarterly Transactions).
Society of Chemical Industry, Journal, 56, Victoria St., London, S.W.1, England.
Society for Experimental Stress Analysis, Proceedings, Central Square Station, P. O. Box 168, Cambridge 39, Mass.
Society of Glass Technology, Journal, Northumberland Rd., Sheffield 10, England.
Steel, Penton Bldg., Cleveland 13, Ohio.
Steel Processing, 108 Smithfield St., Pittsburgh 30, Pa.
Steel Horizons, Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Steelways, 350 5th Ave., New York 1, N. Y.
Stove Builder, Shoreham Hotel, Washington 8, D. C.

T

Technical Data Digest, Wright-Patterson Air Force Base, Dayton, Ohio.
Technical News Bulletin (See National Bureau of Standards, Technical News Bulletin).
Tool and Die Journal, 1975 Lee Rd., Cleveland 18, Ohio.
Tool Engineer, 550 West Lafayette Blvd., Detroit 26, Mich.
Transactions of the American Foundrymen's Association, Room 1198, 222 West Adams St., Chicago 6, Ill.
Transactions of American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.
Transactions of the American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y.
Transactions of the British Ceramic Society, The North Staffordshire Technical College, Stoke-on-Trent, England.
Transactions of the Canadian Institute of Mining and Metallurgy (See Canadian Mining and Metallurgical Bulletin).
Transactions of the Faraday Society, 98, Great Russell St., London, England.
Transactions of the Institute of Welding, 2, Buckingham Palace Gardens, London, S.W.1, England.

U

United Effort, United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

V

Vancoram Review, 420 Lexington Ave., New York 17, N. Y.
Victor Weld (Formerly Weld), 850 Folsom St., San Francisco 7, Calif.

W

Water and Sewage Works, 22 West Maple St., Chicago 10, Ill.
Weld (See Victor Weld).
Welder, Murex Welding Processes Ltd., Waltham Cross, Herts, England.
Welding, Dorset House, Stamford St., London, S.E.1, England.
Welding Engineer, 330 West 42nd St., New York 18, N. Y.

Welding Journal, 33 West 39th St., New York 18, N. Y.
Welding Research (Bound with Institute of Welding, Transactions) (See latter for address).
West of Scotland Iron and Steel Institute, Journal, 39 Elmbank Crescent, Glasgow, Scotland.
Western Machinery and Steel World, 500 Sansome St., San Francisco 11.
Western Metals, 1709 West 8th St., Los Angeles 14, Calif.
Wire and Wire Products, 300 Main St., Stamford, Conn.
Wire Industry, 33, Furnival St., London, E.C.4, England.
Wireless Engineer, Dorset House, Stamford St., London, S.E.1, England.
World Oil, Box 2608, Houston 1, Texas.

II. Foreign Language Periodicals

Most of the foreign journals are available through Stechert-Hafner, Inc., 31 East 10th St., New York 3, N. Y. The Russian journals are also available through Four Continent Book Corp., 253 Fifth Ave., New York 16, N. Y.

A

Académie des Sciences, Comptes Rendus Hebdomadaires Des Séances (See Comptes Rendus [France]).

Academy of Sciences of the USSR, Bulletin, Section of Chemical Sciences. (See Izvestiya Akademii Nauk SSSR Otdelenie Khimicheskikh Nauk).

Academy of Sciences of the USSR, Bulletin, Section of Technical Sciences. (See Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk)

Academy of Sciences of the USSR, Reports (See Doklady Akademii Nauk SSSR).

Acta Chemica Scandinavica (English, French, or German), Einar Munksgaard, Norregade 6, Copenhagen, Denmark.

Acta Crystallographica (English, French, or German), American Institute of Physics, 57 East 55th St., New York 22, N. Y.; or Cambridge University Press, Bentley House, Euston Rd., London N.W., England.

Acta Physica Austriaca (English, French, or German), Springer Verlag, Vienna, Austria.

Alluminio (Italian), Istituto Sperimentale dei Metalli Leggeri, Via della Posta 8/10, Milan, Italy.

Analytica Chimica Acta (English, French, or German), Elsevier Publishing Co., 215 4th Ave., New York, N. Y.

Angewandte Chemie (German), Verlag Chemie, G.m.b.h., Weinheim/Bergstrasse and Berlin, Germany.

Annalen der Physik (German), Johann Ambrosius Barth Verlag, Leipzig, Germany.

Archiv Fur Metallkunde (German), Verlag Chemie, G.m.b.h., Weinheim/Bergstrasse and Berlin, Germany.

Archiv Fur Technisches Messen (German), Leibniz Verlag, Munich, Germany.

Associacao Brasiliera de Metais, Boletim (Portuguese), Associacao Brasieliera de Metais Sao Paulo, Brazil.

Atomes (French), 169 Rue de Rennes, Paris 6, France.

Avtogennoe Delo (Welding) (Russian), Moscow, Russia.

B

Boiler and Turbine Construction (see Kotloturbostroenie).

Boiler and Turbine Manufacture (See Kotloturbostroenie).

Boletim da Associacao Brasiliera de Metais (See Associacao Brasiliera de Metais, Boletim).

Bulletin of the Academy of Sciences of the USSR, Section of Chemical Sciences (See Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk).

Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences (See Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk).

Bulletin de la Société Chimique de France (See Société Chimique de France, Bulletin).

C

Chimia (French, German, or Italian), Rascher-Verlag, Zurich, Switzerland.

Collection of Czechoslovak Chemical Communications (English or French), Ministry of Education of

the Czechoslovak Republic and of the Board of Chemical Industries, Prague, Czechoslovakia.

Comptes Rendus (France) (French), 55 Quai des Grandes-Augustins, Paris, France.

D

Doklady Akedemii Nauk SSSR (Reports of the Academy of Sciences of the USSR) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

E

Experientia (English, French, German, or Italian), Verlag Birkhauser A. G., Basel 10, Switzerland.

F

Factory Laboratory (See Zavodskaya Laboratoriya).

Fonderie (French), L'Association Technique de Fonderie, 46 Victor-Hugo Ave., Paris 16, France.

G

Glass and Ceramic Industry (See Stekol'naya i Keramicheskaya Promyshlennost).

H

Helvetica Chimica Acta (French, German, or Italian), Verlag Birkhauser A. G., Basel 10, Switzerland.

Hutnické Listy (Metallurgical Topics) (Czech), Mucednicka 8, Brno-Zabovresky, Czechoslovakia.

I

Industrial Power (See Promyshlennaya Energetika).

Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk (Academy of Sciences of the USSR, Bulletin, Section of Chemical Sciences) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk (Academy of Sciences of the USSR, Bulletin, Section of Technical Sciences) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

J

Jernkontorets Annaler (Swedish), Kungsträdgardsgatan 6, Stockholm C, Sweden.

Journal of Analytical Chemistry (See Zhurnal Analiticheskoi Khimii).

Journal du Four Electrique et des Industries Electrochimiques (French), 86 Rue Cardinet, Paris 17, France.

Journal of Applied Chemistry (See Zhurnal Prikladnoi Khimii).

Journal de Chimie Physique et de Physico-Chimie Biologique (French), Société de Chimie Physique, Institut de Chimie, 11 Rue Pierre Curie, Paris, France.

Journal of Experimental and Theoretical Physics (See Zhurnal Eksperimental'noi I Teoreticheskoi Fiziki).

Journal of General Chemistry (See Zhurnal Obshchei Khimii).

Journal of Physical Chemistry (See Zhurnal Fizicheskoi Khimii).

Journal des Recherches du Central National de la Recherche Scientifique (French), 13 Quai Anatole France, Paris 7, France.

Journal of Technical Physics (See Zhurnal Tekhnicheskoi Fiziki).

K

Kislorod (Oxygen), (Russian) Government Bureau for the Oxygen Industry, Moscow, Russia.

Kotloturbostroenie (Boiler and Turbine Manufacture) (Russian), Leningrad 21, Russia.

L

La Metallurgia Italiana (Italian), Associazione Italiana di Metallurgia, 10 Via S. Paolo, Milan, Italy.

Le Vide (French), Société Francaise des Ingénieurs Techniciens du Vide, 44 Rue de Rennes, Paris 6, France.

M

Machine Tools and Instruments (See Stanki i Instrument).

Metalen (Dutch or English), Drukkerij-Vitgeverij "de Hofstad," 1-3 Scheepmakersstraat, 's-Gravenhage, Netherlands.

Metall (German), Metall-Verlag, G.m.b.h., 38 Dusseldorfer Str., Berlin W15, Germany.

Metallforschung (German), Dr. Riederer-Verlag, Paulinstrasse 37b, Stuttgart W, Germany.
Metalloberflache (German), Verlag Carl Hauser, Munich 27, Germany.
Metallurgia Italiana, La (See La Metallurgia Italiana).
Metallurgical Topics (See Hutnické Listy).
Metaux & Corrosion (French), Editions Métaux, 32 rue du Maréchal-Joffre, St. Germain-en-Laye (Seine-et-Oise), France.
Microtechnic (English and French), Editions Scriptar S.A., 23 Avenue de la Gare, Lausanne, Switzerland (U. S. agent: 66 Beaver St., New York 4 N. Y.).
Mittellungen des Chemischen Forschungsinstitutes der Industrie Osterreichs (German), Chemischen Forschungsinstitutes der Industrie Osterreichs, 16 Lothrinerstrasse, Vienna 3, Austria.
Monatshefte fur Chemie (German), Springer Verlag, Molkerbastei 5, Vienna 1, Austria.

O

Oxygen (See Kislorod)

P

Physica (English, French, or German), Martinus Nijhoff, The Hague, Netherlands.
Progress in Chemistry (See Uspekhi Khimii)
Pro-Metal (French and German), Metallverband A. G., Berne, Switzerland.
Promyshlennaya Energetika (Industrial Power) (Russian), Moscow, Russia.

R

Recueil des Travaux Chimiques des Pays-Bas (English, French, or German), Nederlandse Chemische Verrenging, Lange Voorhout 5, 's-Gravenhage, Netherlands.
Reports of the Academy of Sciences of the USSR (See Doklady Akademii Nauk SSSR).
Revue de L'Aluminium (French), 77 Blvd. Malesherbes, Paris 8, France.
Revue de Métallurgie (French), 5 Cite Pigalle, Paris 9, France.

S

Schweizer Archiv fur Angewandte Wissenschaft und Technik (German), Buchdruckerei Vogt-Schild AG., Solothurn, Switzerland.
Société Chimique de France, Bulletin (French), Société Chimique de France, 28 Rue Saint-Dominique, Paris 7, France.
Soudure et Techniques Connexes (French), Publications de la Soudure Autogene, 39 rue d'Amsterdam, Paris 8, France.
Stanki i Instrument (Machine Tools and Instruments) (Russian), Government Bureau of Machine Tool Manufacture, Moscow, Russia.
Stekol'naya i Keramicheskaya Promyshlennost (Glass and Ceramic Industry) (Russian), Government Bureau for Industrial Construction Materials, Moscow, Russia.

T

Tools and Instruments (See Stanki i Instrument)

U

Uspekhi Khimii (Progress in Chemistry) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

V

Verres et Refractaires (French), Société d'Editions Verrieres et Céramiques, 34 rue Michel-Ange, Paris 16, France.
Vide, Le (See Le Vide)

W

Welding (See Avtogennoe Delo)

Z

Zavodskaya Laboratoriya (Factory Laboratory) (Russian), Government Bureau of the Metallurgical Industry, Moscow, Russia.
Zeitschrift fur Anorganische Chemie (German), Dieterich'sche Verlagsbuchhandlung, Spiegelgasse 9, Wiesbaden, Germany.
Zhurnal Analiticheskoi Khimii (Journal of Analytical Chemistry) (Russian), Academy of Sciences of the USSR, Moscow, Russia.
Zhurnal Eksperimental'noi i Teoreticheskoi Khimii (Journal of Experimental and Theoretical Chemistry) (Russian), Academy of Sciences of the USSR, Moscow, Russia.
Zhurnal Fizicheskoi Khimii (Journal of Physical Chemistry) (Russian),

Academy of Sciences of the USSR, Moscow, Russia.

Zhurnal Obshichei Khimii (Journal of General Chemistry) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

Zhurnal Prikladnoi Khimii (Journal of Applied Chemistry) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

Zhurnal Teknicheskoi Fiziki (Journal of Technical Physics) (Russian), Academy of Sciences of the USSR, Moscow, Russia.

III. Miscellaneous Material

Aeronautical Research Council, His Majesty's Stationary Office, London, England.

Agricultural & Mechanical College of Texas, School of Engineering, College Station, Texas.

Aluminum Co. of America, Pittsburgh, Pa.

Aluminium Development Association, 33 Grosvenor St., London, W.1, England.

American Electroplaters' Society, Box 168, Jenkintown, Pa.

American Gas Association, 420 Lexington Ave., New York 17, N. Y.

American Institute of Electrical Engineers, 33 West 39th St., New York 18, N. Y.

American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

Armour Research Foundation, Illinois Institute of Technology, 35 West 33rd St., Chicago 16, Ill.

Atomic Energy Commission, Documents Publication Section, Technical Information Branch, P. O. Box E, Oak Ridge, Tenn.

Battelle Memorial Institute, Columbus, Ohio.

Beryllium Corp., Reading, Pa.

British Columbia Research Council, University of British Columbia, Vancouver, B. C.

British Information Service, 30 Rockefeller Plaza, New York, N. Y.

British Iron and Steel Federation, Steel House, Tothill St., Westminster, London, S.W.1, England.

Bureau of Mines, Washington, D. C.

Bureau of Mines Minerals Yearbook, Supt. of Documents, Washington, D. C.

Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York 17, N.Y.

Carnegie Institute of Technology, Coal Research Laboratory, Pittsburgh, Pa.

Cerium Metals Corp., 522 5th Ave., New York 18, N. Y.

Copper Development Association, Grand Buildings, Trafalgar Square, London W.C.2, England.

Council for Scientific and Industrial Research, Melbourne, Victoria, Australia.

Department of the Interior, Washington, D. C.

Electrodepositors Technical Society, Northampton St., London, E.C.1, England.

Engineering Experiment Station, University of Illinois, Urbana, Ill.

Engineering Experiment Station, Purdue University, Lafayette, Ind.

Federation of British Industries, 21 Tothill St., London, S.W.1, England.

Ferro Enamel Corp., 4150 East 56th St., Cleveland 5, Ohio.

Forest Products Research Society, Box 2010, University Station, Madison 5, Wis.

Forest Service, U. S. Dept. of Agriculture, Forest Products Laboratory, Madison, Wis.

Geological Survey, U. S. Department of the Interior, Washington.

Handy & Harman, 82 Fulton St., New York 7, N. Y.

H. M. Stationary Office, London, England.

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Institute for the Study of Metals, University of Chicago, Chicago, Ill.

Institution of Mechanical Engineers, Storey's Gate, St. James Park, London, S.W.1, England.

International Nickel Co., 67 Wall St., New York 5, N. Y.

Institute of the Rubber Industry, W. Heffer & Sons Ltd., Cambridge, England.

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Master Boiler Makers' Association, 29 Parkwood St., Albany, N. Y.

Metal Powder Association, 420 Lexington Ave., New York 17, N. Y.

Mines Experiment Station, University of Minnesota, Minneapolis, Minn.

Munitions Supply Laboratories, Department of Munitions, Commonwealth of Australia, Maribyrnong, Victoria, Australia.

National Advisory Committee for Aeronautics, Washington, D. C.

National Industrial Conference Board, Inc., 247 Park Ave., New York 17, N. Y.

North Carolina State College, Raleigh, N. C.

Northeastern Wood Utilization Council, P. O. Box 1577, New Haven 6, Conn.

Office of Temporary Controls, Washington, D. C.

Pennsylvania State College, School of Mineral Industries, State College, Pa.

Radio Corp. of America, R.C.A. Laboratories Division, Research Dept., Princeton, N. J.

Society of Automotive Engineers, Inc., 29 West 39th St., New York 18, N.Y.

Timber Engineering Co., 1319 18th St., N.W., Washington 6, D. C.

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University of Melbourne, Melbourne, Australia.

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U. S. Bureau of Mines, Washington, D.C.

U. S. Department of the Interior, Washington, D. C.

Virginia Polytechnic Institute, Blacksburg Va.

Waverly Petroleum Products Co., Philadelphia 6, Pa.

AUTHOR INDEX

Authors' names are indexed by section number and item number rather than by page. The numerals and letters preceding the hyphen refer to the section; the numerals following the hyphen refer to the number of the literature listing.

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SUBJECT INDEX

The 27 classifications of the Review of Metal Literature are primarily classification by *process,* and therefore in preparing this index, the major emphasis has been placed on *materials.* It is hoped that sufficient cross-references have been included to guide the user who is seeking *all* material on a subject which is not a sectional division. Under subject headings which are also sectional headings (such as **Corrosion, Welding, Foundry**) only a general reference has been made to other entries, on the assumption that a user desiring all material would turn first to the appropriate section in the book rather than to the subject index.

Alloy systems are indexed in the order of the constituent whose initial letter comes first in the alphabet, i.e., **Aluminum-gold, Copper-nickel, Tin-zinc,** with no regard to percentage composition. Indexing is by section number and item number rather than by page. The numerals and letters preceding the hyphen refer to the section number; the numerals following the hyphen refer to the number of the literature listing.

MEREDITH SMITH WEIGHT

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